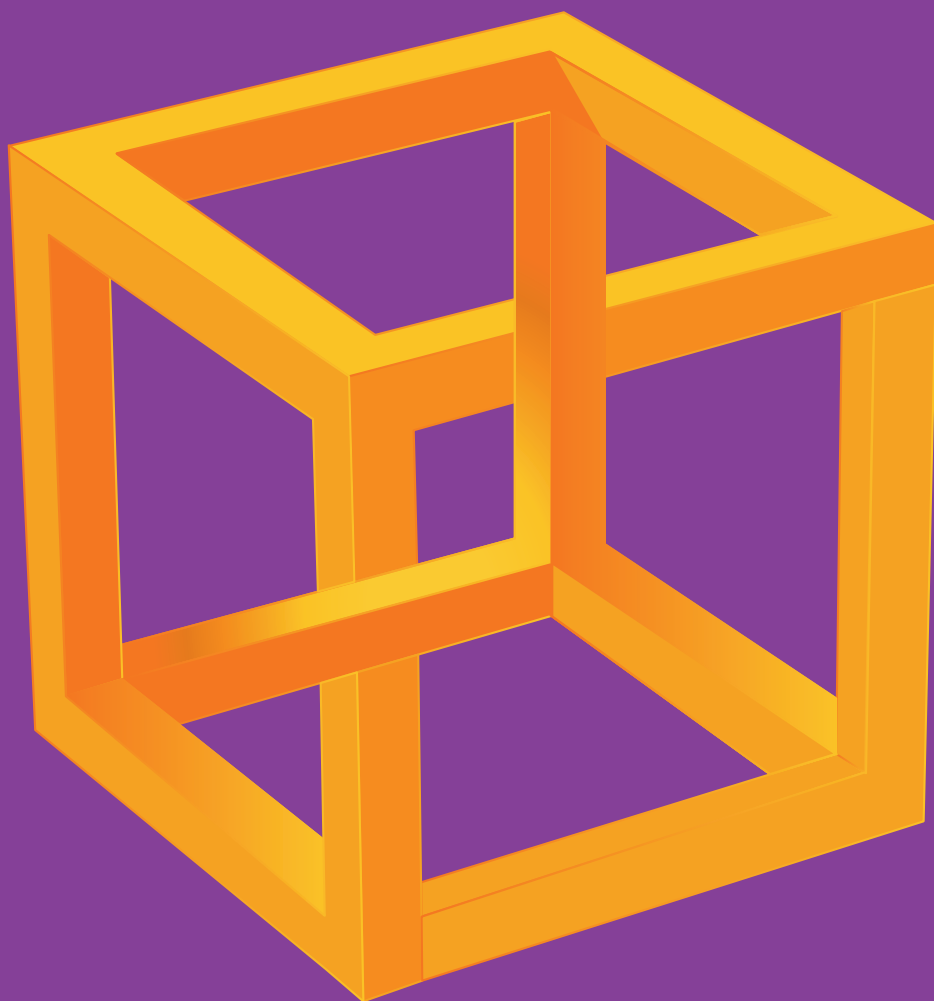


Outside the Box

**Rethinking ADD/ADHD
in CHILDREN and ADULTS**

A PRACTICAL GUIDE



Thomas E. Brown, Ph.D.

ADVANCE PRAISE FOR

Outside the Box

Rethinking ADD/ADHD

in CHILDREN and ADULTS

A PRACTICAL GUIDE

"This down-to-earth book shows what ADHD really is and what it isn't. Brown gives us a true 'feel' for ADHD and the impact of symptoms on people's lives. He defines executive functions in clear examples just as his patients described to him. For those who want an in-depth understanding of ADHD as it occurs in children, youth and adults, this book is a must read."

*Michael J. Manos, Ph.D., Head of Pediatric Behavioral Health,
Cleveland Clinic*

"Professor Brown translates complex science into everyday language. This is THE guide for anyone having questions or doubts about ADHD. Case descriptions are delivered in an empathic tone that only one who has dedicated a lifetime to caring for patients and families with ADHD could provide. Highly recommended for patients, their families, and professionals interested in ADHD."

*Luis Augusto Rohde, M.D., Professor of Psychiatry, Federal University of
Rio Grande do Sul, Brazil, & President of the World Federation of ADHD*

"This book is essential reading for anyone who wants to better understand ADHD across the life span. Brown gathers together some of the best thinking and research from a variety of fields to answer some of the most crucial questions about this still vexing and all-too-common condition. He has delivered a clear, comprehensive work that is both engaging and original. A rewarding, useful, and accessible read."

*F. Xavier Castellanos, M.D., The Child Study Center at NYU Langone
Medical Center, Department of Child and Adolescent Psychiatry*

"*Outside the Box* offers an accessible update on the latest research about ADHD and answers questions and doubts that many struggle with about this disorder, which is very prevalent in children and adults all over the world."

Sandra Kooij, M.D., Ph.D., Chair, European Network Adult ADHD

"Tom Brown's clearly written evidence-based update on attention-deficit/hyperactivity disorder is a must read for professionals working with people struggling with ADHD as well as for adolescents and adults with ADHD who are seeking a deeper understanding of the disorder. The many clinical vignettes add interest and remind us of the person behind the diagnosis. Sections debunking common misunderstandings and summarizing important facts about ADHD are gems!"

Mina K. Dulcan, M.D., Head, Child and Adolescent Psychiatry, Ann and Robert H. Lurie Children's Hospital of Chicago and Professor of Psychiatry and Behavioral Sciences and Pediatrics, Northwestern University Feinberg School of Medicine

"Comprehensive, compassionate, and clear, Brown's authoritative survey on attention-deficit disorders integrates rich clinical experience with cutting-edge neuroscience and epidemiology. Brown's own 'out of the box' views on such topics as measurement bias and nonpharmaceutical adjunctive treatment are compelling. This rigorous yet approachable text is ideal for clinicians, academic researchers, parents, and patients alike."

Ronald C. Kessler, Ph.D., McNeil Family Professor, Department of Health Care Policy, Harvard Medical School

"Well written, clear, and concise, Dr. Brown's *Outside the Box* explodes many of the myths and misunderstandings surrounding ADHD. In his calm, reassuring style, he provides the information families and young adults with ADHD need not only to understand this disorder but also to seek out proper treatment. This is a much-needed book amidst all the confusion that abounds today."

Patricia O. Quinn, M.D., Developmental Pediatrician, Washington, DC, and author of 100 Questions and Answers About Attention-Deficit Hyperactivity Disorder (ADHD) in Women and Girls

"Dr. Brown, a leading international expert in ADD and related conditions, provides a superb, nuanced introduction to this multifaceted condition and a rich, personal, compassionate exploration of the challenges faced by at least 5% of the world's population. His advice and guidance on how to anticipate and deal with the realities of ADD make this a must read for teachers, psychologists, and medical professionals, as well as for the parents, teens, adults, and partners whose lives are directly touched, and potentially derailed, by ADD. Dr. Brown's guidance is especially important in today's world with its vast array of information, much of which is incomplete, contradictory, unscientific, outdated, and at times simply wrong."

James F. Leckman, M.D., Ph.D., Neison Harris Professor of Child Psychiatry, Psychiatry, Pediatrics and Psychology, Yale University

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by

Thomas E. Brown, Ph.D.

AMERICAN
PSYCHIATRIC
ASSOCIATION

PUBLISHING



Note: The authors have worked to ensure that all information in this book is accurate at the time of publication and consistent with general psychiatric and medical standards, and that information concerning drug dosages, schedules, and routes of administration is accurate at the time of publication and consistent with standards set by the U.S. Food and Drug Administration and the general medical community. As medical research and practice continue to advance, however, therapeutic standards may change. Moreover, specific situations may require a specific therapeutic response not included in this book. For these reasons and because human and mechanical errors sometimes occur, we recommend that readers follow the advice of physicians directly involved in their care or the care of a member of their family.

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The brain's complexity is no accident—instead, complexity is one of its central “design features” and essential to its flexible and robust operation. Complexity, and with it the capacity to respond and act differently under different circumstances, is the brain's answer to the persistent challenges of a variable and only partly predictable environment.

Olaf Sporns
Networks of the Brain

The untangling of the complexity has barely begun.... But even at its early stages, the whole business of the matter of the mind requires a global view if we are to get anywhere.

Gerald M. Edelman
Bright Air, Brilliant Fire: On the Matter of the Mind

As physicians strive to gather more data, to see more, to be more objective, to be more scientific, they are often experienced by their patients as not listening.... Listening is central to learning about and coming to understand a sufferer.... The healer learns about the sufferer in direct proportion to the quantity *and* quality of his listening.

Stanley W. Jackson
“The Listening Healer in the History of Psychological Healing”

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About the Author

THOMAS E. BROWN IS A CLINICAL PSYCHOLOGIST who received his Ph.D. from Yale University and is Director of the Brown Clinic for Attention and Related Disorders in Manhattan Beach, California. He served on the clinical faculty of the Yale Medical School for 20 years and is now Adjunct Clinical Associate Professor of Psychiatry and Behavioral Sciences at the Keck School of Medicine of the University of Southern California. He is an elected Fellow of the American Psychological Association and has lectured at universities and professional organizations throughout the United States and in more than 40 other countries. Dr. Brown is author of the Brown Executive Function/Attention Rating Scales and four previous books: *Attention Deficit Disorder: The Unfocused Mind in Children and Adults* (2005), *ADHD Comorbidities: Handbook for ADHD Complications in Children and Adults* (2009), *A New Understanding of ADHD in Children and Adults: Executive Function Impairments* (2013), and *Smart but Stuck: Emotions in Teens and Adults with ADHD* (2014). His Web site is www.DrThomasEBrown.com.

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Preface

FIFTY YEARS AGO WHEN I BEGAN MY CLINICAL training at Yale, the dominant approach to understanding psychological problems was psychoanalysis. That approach in our training had significant limitations, but it had two great strengths: it emphasized the subtle complexity of each individual and the critical importance of clinicians carefully listening to help persons discover the complexity of their struggles and their own strengths. Over the past five decades, neuroscience and technologies have brought impressive discoveries about the amazing processes of brain development and functioning as well as medication treatments that can significantly alleviate some sufferings of the human mind.

This book is an effort to merge what I have learned from study of psychological and neuroscientific research with what I have been taught by a half century of trying to listen carefully while talking with children, adolescents, and adults who have shared with me their personal experiences with ADD/ADHD and related problems. I am deeply grateful to my patients for all they have taught me about the subtle complexities of their attentional problems and their extraordinary strengths in dealing with them.

The one who most helped me to refine my own ability to listen, to respect and to appreciate the complexities of others is also the one who first encouraged me to write this book—my wife, Roberta (Bobbie) Brown, an artist and writer, profoundly sensitive to beauty not only in art and poetry but also in countless encounters of daily life. She was also a woman of quick wit who greatly enjoyed dark, ironic humor. We shared 47 precious years together as we raised our remarkable daughter and son, Liza and Dave, both of whom, along with my sister, Nancy, and our grandchildren, Noah and Simone, have continued to provide much love and support to enrich my life, particularly since Bobbie's death in 2014.

Throughout the process of writing this book, I have benefitted substantially from the steadfast assistance and down-to-earth advice of Dr. Ryan J. Kennedy. For 4 years, he worked as my research assistant while completing his doctoral training; he is now my associate on the staff of the Brown Clinic for Attention and Related Disorders.

I owe thanks also to John McDuffie, Associate Publisher at American Psychiatric Association Publishing, for nurturing this project over several years; to Maria Lindgren for skillfully and patiently editing my countless revisions; to Greg Kuny, Managing Editor for keeping the whole process moving; and to Tammy Cordova for designing the intriguing cover for the book.

Thomas E. Brown, Ph.D.
December 2016

Introduction

FOR DECADES, THE DISORDER CURRENTLY KNOWN as attention-deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD) has been stuck in a box of simplistic old assumptions on the basis of having been identified long ago as a problem of little boys who didn't listen, were hyperactive, and chronically misbehaved. Many of those assumptions were based on outdated understandings of the human brain. Much remains to be learned about this syndrome, but there is now enough scientific evidence to step outside that box to rethink old assumptions and to develop a more up-to-date, science-based understanding of this disorder, which significantly impairs and causes considerable suffering for about 8%–10% of children and at least 5% of adults.

Below are 20 assumptions about ADHD that need rethinking in light of recent research. Each is followed by a very brief statement of facts that challenge that assumption and are reasons why it should be reconsidered.

Assumption #1: ADHD is a simple problem of not listening and not staying focused on a task.

Facts: Research has demonstrated that ADHD is impairment of a complex syndrome of brain functions essential for self-management: the *executive functions*. These include motivation and prioritizing for tasks, focusing and shifting focus as needed, managing sleep and alertness, sustaining effort, modulating emotions, self-monitoring actions, regulating processing speed, and utilizing working memory to keep information in mind while attending to multiple tasks. ADHD-related

impairments are more like the difficulties encountered when carrying out the multiple functions involved in focusing on driving than they are like the act of focusing a camera to take a picture. (See Chapter 2.)

Assumption #2: ADHD is essentially just hyperactivity, impulsivity, and behavior problems.

Facts: Many individuals identified as having ADHD have never had any significant behavior problems and even those who had problems with hyperactive behavior in childhood usually have much less difficulty with behavior problems from adolescence on. The primary problems of ADHD are with *attention*, broadly conceived as the management system of the brain, its executive functions. The DSM-5 (American Psychiatric Association 2013) label for this disorder includes the term *hyperactivity* even for individuals who are not and never were hyperactive. This label perpetuates older views and widespread misunderstanding of the disorder. (See Chapter 2.)

Assumption #3: ADHD affects mostly males; girls and women rarely suffer from ADHD.

Facts: During childhood and adolescence, three boys are identified with ADHD for every one girl; however, the number of women diagnosed with ADHD in adulthood is almost equal to the number of men with that diagnosis. Reports from women seeking treatment for ADHD indicate that many of them have suffered for many years with undiagnosed ADHD prior to their seeking treatment for themselves. (See Chapter 3.)

Assumption #4: Everyone has ADHD sometimes.

Facts: All of the symptoms characteristic of ADHD are similar to problems that everyone has sometimes, but not everyone has the severity of impairment required for an ADHD diagnosis. For individuals diagnosed with ADHD, those problems must be significantly more persistent and more impairing than for most persons of similar age and must seriously interfere with many aspects of their daily life. (See Chapter 3.)

Assumption #5: ADHD always starts in childhood, never in adolescence or adulthood.

Facts: For decades, it has been assumed that ADHD always starts during childhood, but recent longitudinal studies of individuals carefully evaluated and found to not have ADHD during childhood showed that a significant percentage turned out to have developed ADHD impairments by midlife. This may be due to their having ADHD impairments that were not very noticeable until they met challenges for self-management that arise only in adulthood, or it may be delayed action of genes, or both. Usually, ADHD is inherited, but it is not always present in childhood. Recent genetic studies indicate that, in some cases, genetic influences impacting ADHD do not emerge and cause symptoms until adolescence or early adulthood. (See Chapter 3.)

Assumption #6: ADHD is simply a lack of “willpower”; they can do it when they want to.

Facts: Virtually everyone diagnosed with ADHD has a few activities or tasks for which they have no difficulty utilizing their executive functions, but these executive functions are significantly impaired for most other tasks they do. This happens because strong interest in or strong fear about a task changes their brain chemistry to overcome their usual problems with motivation. However, this change is not under voluntary control. (See Chapter 1.)

Assumption #7: ADHD is always outgrown or always continues for a lifetime.

Facts: Follow-up studies show that about 75% of individuals with ADHD in childhood continue to experience significant ADHD-related impairments into adulthood. However, about 25% no longer have significant impairment from ADHD during adulthood. For those whose ADHD-related impairments do not persist, there are some measurable differences in brain development relative to those who continue to experience impairment from ADHD. (See Chapter 3.)

Assumption #8: There is no scientific evidence for diagnosis of ADHD.

Facts: There is strong, objective, scientific evidence that ADHD is highly heritable, that individuals with ADHD experience delays of 2–3 years or more in development of specific areas of the brain that support executive functions, that ADHD is associated with unique weaknesses of connection and communication between regions of the brain, that it is associated with different patterns of cortical thinning, and that treatment with approved medications improves ADHD symptoms during the times the medication is active in about 70%–80% of those affected. (See Chapter 1.)

Assumption #9: Highly intelligent people never have ADHD; they're smart enough to work around it.

Facts: Many studies have demonstrated that some children and adults with high IQ have ADHD. Despite their intellectual strengths, they tend to have significant weaknesses in working memory, processing speed, motivation, and other aspects of ADHD that are independent of their other cognitive abilities and often interfere with their ability to deploy those strong abilities. (See Chapter 3.)

Assumption #10: ADHD is simply a motivational problem; it has nothing to do with emotions.

Facts: Research has revealed that emotions, mostly unconscious emotions, attached to the individual's personal store of unconscious memories and learning, are the primary basis on which each person's brain determines moment-by-moment motivation—what is, at that moment, interesting and important, or not, to that individual. Working memory problems of ADHD are associated with chronic problems in managing these emotion-based motivations and priorities for activities of daily life. (See Chapters 2 and 5.)

Assumption #11: ADHD can be diagnosed objectively with neuropsychological or imaging tests.

Facts: Impairments of ADHD are demonstrated over time in many diverse activities of daily life. They cannot be assessed adequately by brain scans or neuropsychological tests done over a short time in an office. Adequate assessment requires an adequately trained specialist systematically gathering information from self-report and others about the person's life situation, health, education, and many aspects of daily functioning over time and in various settings, relative to others of comparable age. A normed rating scale should also be utilized. (See Chapter 8.)

Assumption #12: Treating ADHD with medications is more dangerous than not treating ADHD.

Facts: Medications most often used to treat ADHD are controlled by the government because if abused by taking excessive doses, they can become addictive. This causes some people to fear that even well-controlled dosing could cause addiction. Research has shown that a child with ADHD not treated with appropriate medication has double the risk of developing a substance use disorder at some time in comparison with a child who does not have ADHD. Those treated appropriately with medication for ADHD have no more risk of having a substance use disorder in adolescence than would someone without ADHD. (See Chapter 10.)

Assumption #13: ADHD is unrelated to other learning and psychiatric disorders.

Facts: Research has demonstrated that an adult with ADHD has six times the risk of having at least one additional learning or psychiatric problem that warrants diagnosis at some point in his or her life. This is because the executive function impairments of ADHD often underlie other disorders. Unfortunately, clinicians often diagnose and treat other disorders with which they are more familiar, such as anxiety, depression, dyslexia, mood disorders, or substance use disorders, but do not recognize an underlying ADHD that may require treatment to help the individual to attain adequate functioning. (See Chapter 7.)

Assumption #14: Most medical and mental health professionals are trained to diagnose and treat ADHD effectively.

Facts: Most medical and mental health professionals, including psychologists, psychiatrists, and other physicians, have had very little or no professional training in assessment or treatment of ADHD, especially in adolescents and adults. Some have developed proficiency by getting extra training for ADHD, but currently, this is the exception, not the rule. (See Chapter 8.)

Assumption #15: ADHD looks pretty much the same at every age level.

Facts: ADHD-related impairments are determined based on the level of development of executive functions commonly demonstrated by most individuals of similar age. Infrastructure of the brain that supports executive functions develops very slowly and is not fully matured until late teens or early 20s. A person with ADHD is one whose executive functions are significantly underdeveloped or inconsistent relative to those of most others of comparable age. (See Chapter 4.)

Assumption #16: Once adequate executive function has developed, it will persist.

Facts: Natural developments in midlife and beyond can impair executive functioning. Also, as one gets older, normal development includes some processes of decline. The aging process alone tends to produce some impairments of executive functioning in persons not experiencing disease processes such as dementia. For example, some women experience in menopause some executive function impairments as their estrogen levels diminish. Recent research has shown that treatment with ADHD medications may help those women. Also, both genders tend to experience some slowing of processing speed and diminution of working memory efficiency as an aspect of normal aging. Some older adults report that treatment with ADHD medication seems to alleviate these developmental impairments somewhat. (See Chapter 6.)

Assumption #17: Current DSM-5 diagnostic criteria are sufficient for recognizing ADHD.

Facts: Current DSM-5 diagnostic criteria for ADHD are based on research done with children 4–17 years old. Some additional examples of symptoms in adults have been added, but many researchers agree that although the current criteria pick up some impairments associated with ADHD in adults, they do not include many aspects of executive function impairments that are important aspects of the syndrome, particularly some that may not be noticeable until late adolescence or adulthood. (See p. xix.)

Assumption #18: ADHD is purely an American problem; it is not found elsewhere in the world.

Facts: When the same diagnostic criteria are utilized, ADHD is found in most developed and developing countries, especially where there are significant demands for literacy. Despite methodological differences and regional differences, a meta-analysis of 102 studies including 171,000 individuals found the prevalence of ADHD to be 5.29% among persons 18 years or younger from regions all over the world. (See p. xxii.)

Assumption #19: ADHD is really a problem only during school years; it does not have any significant lasting negative impact on an individual's adult life.

Facts: Long-term studies comparing sample groups of individuals with ADHD to matched groups without ADHD show that those with ADHD are less likely to complete high school, complete fewer years of post-high school education, are less likely to complete a college degree, are more likely to be employed in unskilled occupations, are more likely to have a substance use disorder, and are more likely to quit or be fired from a job. Some with ADHD are very successful in adult life, but for many, ADHD-related impairments bring many continuing difficulties. (See Chapter 3.)

Assumption #20: The importance of ADHD is exaggerated by the media.

Facts: Media reports rarely describe the complexity of ADHD and the multiple ways it impacts the lives of those millions of children and adults and their families who experience this disorder, which is highly prevalent in the United States and around the world. Population studies have shown that, as a group, those with ADHD tend to have not only many difficulties in education, employment, social interactions, and other activities of daily life but also increased risk of premature death, mostly due to accidents. One population study found that individuals with ADHD also have elevated risk for attempted suicide and completed suicide. (See Chapter 1.)

Goals of This Book

Outside the Box was not written solely to challenge mistaken assumptions about ADHD. It is also intended to provide updated, science-based answers to questions many people have about attention-deficit disorders. Some readers may wonder whether they may have ADHD and how to get an adequate diagnosis. Others know they have ADHD but have questions on whether it is safe to treat it with prescribed medications. Some are perplexed about why they or others they know are able to focus and work very well for certain specific tasks or activities but have serious ADHD problems when they try to focus on most other tasks they need to do. Others believe they have ADHD but sensibly wonder whether their chronic difficulties in school, work, or social relationships are actually being caused not by ADHD but by smoking too much marijuana, excessive use of alcohol, or unrecognized psychiatric problems. Still others struggle unsuccessfully in undergoing treatment for their recognized anxiety, depression, learning disorder, or substance use problems and reasonably question whether their unsuccessful treatment may be due to underlying ADHD problems that have never been recognized or even asked about.

For most people at this time, it is not easy to get adequate answers to questions like these. Media, the Internet, and countless books and magazine articles offer contradictory information, much of which is unscientific, outdated, and wrong. Many physicians, psychologists, and other mental health professionals are not yet well informed about current scientific understanding of this complex disorder, which affects millions of children, adolescents, and adults throughout the world and

can seriously disrupt learning, employment, family relationships, social interactions, health, safety, and self-esteem for decades or a lifetime.

This book offers science-based answers in plain, understandable language to a wide variety of questions about ADHD that are often raised not only by adolescents and adults in the general public but also by professionals in pediatrics, general medicine, psychiatry, psychology, nursing, education, and other related fields.

Unlike some books, this volume offers a science-based perspective that is not limited to the understanding of ADHD provided in the current psychiatric diagnostic manual, DSM-5. DSM-5 is a valuable source of information about ADHD, but its diagnostic criteria for adults are based on field research with children ages 4–17 years and not on field research with adults. DSM-5 criteria do not include symptoms of executive function impairment that are most highly predictive of ADHD in adults and that most effectively distinguish ADHD from other psychiatric disorders (Kessler et al. 2010). Rigid application of current DSM-5 criteria for ADHD does not adequately identify some adults significantly impaired by this syndrome.

The current name of this disorder is problematic. DSM-5 confusingly continues to use the term *attention-deficit/hyperactivity disorder* to identify persons with ADHD who do not have, and may never have had, any problems with hyperactivity. Although the older term *attention-deficit disorder* or the newer term *executive function deficit disorder* (EFDD) would seem preferable, in this book I use the current official DSM-5 term *attention-deficit/hyperactivity disorder* to refer to presentations of the disorder with or without hyperactivity or impulsivity. I also report and utilize scientific research findings that move beyond the constraints of the DSM-5 description of ADHD.

The book's table of contents lists the overall topic of each chapter and also highlights one or two of the puzzling questions many people have that are related to that topic. Each chapter includes broad information about its theme as well as answers to the specific topic question. The chapters also provide much additional information on other related questions about ADHD often raised by laypersons and professionals. Embedded throughout each chapter are brief citations to sources for the information provided; these sources can be consulted for additional, more technical information. The reference list at the end of the book provides more detail.

The subtitle *A Practical Guide* is intended to emphasize that this book is focused primarily not on details of academic arguments but on practical aspects of ADHD—how it varies from one person to another, how it changes over the person's life span, how treatments need to be ad-

justed to different individuals, and how it sometimes gets better and sometimes gets worse.

The book is based on current scientific research and also on the experience and perspective of a clinician who has invested most of his work over more than 35 years in studying this disorder not only by reading scientific studies and doing research but also through countless hours of listening to, talking with, and providing treatment for a wide variety of children, teenagers, and adults with ADHD and related problems.

It is important to note that there is much ongoing research on ADHD, some of which it is hoped will provide the basis for broader perspectives and continuing improvements in our understanding of ADHD and our ability to provide safe and effective treatment for those who experience it. This book might be regarded simply as a statement about the current picture of our developing understanding of these complexities of the mind.

However, there is yet another purpose to *Outside the Box*. In this book, I seek to highlight multiple perspectives on how ADHD affects both individuals who suffer directly from it and those who love and care for those children and adults who have ADHD.

Many people think of ADHD as a trivial problem of children or adults who are scatterbrained, often a bit disorganized, frequently late, and excessively forgetful. In contrast, some consider ADHD to be an extraordinary gift that endows the person with exceptional talent, creativity, and the ability to “think outside the box.” Still others are convinced that ADHD is simply annoying laziness or apparent lack of willpower because they have seen that individuals with ADHD tend to focus and perform quite well on a few tasks or activities in which they have strong personal interest, even though they consistently fail to mobilize that same level of focus and effort for many other activities that are important for others or themselves.

Yet for children and adults who are affected with ADHD-related impairments that warrant diagnosis, this disorder, when ignored or inadequately treated, is not trivial. It is chronically frustrating, embarrassing, and discouraging in multiple aspects of daily life. Although some people with this disorder have impressive gifts of talents and skills related to their ADHD and are quite successful, most of those individuals also are seriously burdened by the disorder. Because of the persistent inconsistency it creates, this impairment of the brain’s self-management system can destroy self-confidence and severely erode one’s hope for ever being adequate to meet reasonable expectations of family, teachers, employers, friends, or oneself.

One example is a 19-year-old young man who came with his parents to consult with me over the Christmas break of his first year of college. Let's call him Jake.

Case Example: A college student who thinks his life is hopeless

He was good-looking, friendly, and bright. He greeted me with a warm handshake and a winning smile. As the four of us sat together in my office, I asked Jake why he had come to see me. He said, "My parents want me to talk to you because I went off to college last fall determined to be, for once, a decent student. My parents and teachers always tell me that I'm pretty smart. I did really well on my SATs, but since junior high, I've never been a good student. I don't get much of my reading or homework done on time, sometimes not at all. Even when I know it's important to study more for a test or to get started early enough on a paper to do a good job, I plan to do it, but then I keep putting it off until it's way too late. That's why, despite my high SATs, I wasn't able to get into any school better than this pathetic little college I'm stuck in now."

"I had figured I would go there, work hard freshman year, and then transfer to a better college, the kind of school most of my friends are in. I didn't party much, but I also didn't get much work done. Last week, my first semester grades were posted. I got a B in one course where I had a really interesting professor, but the other four courses were all Fs. My plan to transfer to a better school, the kind of school I should be in, is now down the toilet. My parents say they're willing to pay for one more semester to see if I can do better, but I don't see how it's ever going to get any better. If I go back in 2 weeks for spring semester to try again, it will probably be the same old thing I've been doing since junior high. I've been thinking a lot this week about how my situation is totally hopeless."

I spoke privately with Jake and asked him what he had in mind when he told us that he saw his situation as totally hopeless. He fell silent for couple of minutes, and then his eyes filled up. "When I saw those grades, it finally hit me that I really am going no place. I've been given so much, and I've passed by so many opportunities! It's too late now. Last week while we were visiting at my grandparents' house, I went into their medicine cabinet and grabbed a bunch of pills. Then I got a bottle of vodka. I took them to my room and hid them. Two nights ago, it was about 2 A.M. and I was alone thinking about how hopeless my life is. I took out the pills and laid them out in six rows. There were 180 of them. Then I took out the vodka. I was going to start drinking the vodka and then take every one of those pills. I wanted my life to be over because I just can't get myself to do what I need to do. I'm a loser!"

I asked Jake how he decided not to kill himself that night. He explained that he had gotten into thinking about how deeply that would hurt his parents for the rest of their lives. And he remembered that they had made this appointment for him to see me to try to figure out a way things might get better. He said he was not sure that anything would

ever work for him, but he had decided to check out this consultation and maybe give one more approach a try, even though he continued to have serious doubts about whether it would actually work.

Not every person with ADHD feels so profoundly hopeless as Jake did that evening, but many struggle often with persistent feelings of frustration, helplessness, and shame that result from their experiences with inadequately understood and inadequately treated ADHD. Over the past 20 years, there has been increasing talk about ADHD among professionals in medicine, mental health, and education, as well as in the media throughout the world. Much of this talk has been argument about whether this disorder is being overdiagnosed and whether increasing use of medications to treat ADHD in children and adults is a safe and useful benefit or a risky mistake. Unfortunately, many of these polemical discussions have not been adequately informed by relevant scientific facts or adequate understanding of ADHD. More importantly, these discussions tend to completely overlook or ignore the frustration and pain that those affected with untreated or inadequately treated ADHD are forced to live with.

Scientific research about ADHD and the workings of the human brain has generated substantial changes in our understanding of ADHD and related disorders. In this book, I build on updated, science-based information to describe in very practical terms how ADHD can be recognized at various ages, how it differs from more typical brain development, how it can significantly impair those affected, and how it can be safely and, in most cases, effectively treated in children and adults. Equally necessary is an empathic understanding of the impact of ADHD on individuals and family members who are affected.

I emphasize in this book the importance of empathic understanding of ADHD and using this perspective to explain this syndrome to patients and their families in understandable language. I also offer detailed, practical strategies for providing empathic, science-based treatment for children and adults with ADHD and their families.

In 2014, psychologist Stephen Hinshaw and economist Richard Scheffler published *The ADHD Explosion*, a book that describes various scientific, economic, and cultural reasons for the escalating rate of youths and adults being diagnosed with ADHD in the United States and internationally. They estimated that, despite considerable stigma and social controversy, lifetime rate of diagnosis for youths with ADHD may rise over the next 5 years from the current estimated U.S. level of 11% to as high as 13%. Their review concluded that

ADHD is here to stay and so is medication. ADHD is now an established part of child, adolescent and adult mental health with more than suffi-

cient evidence for its largely biological underpinnings and major associated impairments.... Stimulants work far too well for individuals with ADHD...for this diagnosis and such medications to quickly leave the scene. (Hinshaw and Scheffler 2014, p. 161)

Some epidemiologists and other researchers have questioned the accuracy of estimates of ADHD prevalence such as those cited by Hinshaw and Scheffler. Careful research suggests that reports of explosive increases in the prevalence of ADHD in the United States and in other countries throughout the world have been somewhat exaggerated because they are based on counting cases without adequate attention to the difference between those who have simply reported having symptoms of ADHD and those whose symptoms have been carefully assessed clinically and found actually to meet levels of impairment required for legitimate diagnosis (McKeown et al. 2015; Polanczyk et al. 2014). However, even if prevalence of ADHD is not increasing “explosively,” there is reason to believe that the number of individuals who have ADHD is large, and the number seeking treatment is likely to become larger as the disorder is more adequately understood and as more adequate resources for assessment and treatment become available.

Following their review of the rapid growth in the diagnosis of ADHD, Hinshaw and Scheffler (2014) lamented that most of the individuals currently being diagnosed with ADHD receive seriously inadequate assessments by clinicians who have had little training in assessment and treatment of ADHD. They urged “that ADHD be diagnosed carefully by professionals who know their business” and “that ADHD be treated by clinicians (and paraprofessionals) who are versed in evidence-based interventions” (p. 166).

At present, most medical, mental health, and educational professionals receive little or no instruction during their professional education to help them learn to recognize and treat ADHD in children or adults. More adequate and updated education about ADHD is desperately needed for these professionals. Improved understanding of this disorder is also needed in the general public so that parents of children with ADHD and those adolescents and adults affected will have ready access to updated, scientifically based information to counter widespread prejudices and misunderstandings.

This book is intended to provide understandable, science-based, practical guidance for explaining and treating ADHD. It is intended for the wide variety of clinicians involved in assessing or planning and monitoring treatment of children and adults with this disorder: pediatricians; primary care physicians caring for children, adolescents, and adults; psychologists; psychiatrists; neurologists; physician assistants;

advanced practice nurses; and clinical social workers. It could also be helpful to educators in primary, secondary, and postsecondary settings; disability service providers; and human resource specialists, as well as to adolescents and adults who are seeking more information about ADHD assessment and treatment for themselves or for family or friends.

In this book, ADHD is understood not only in the limited terms of DSM-5. It incorporates the DSM-5 ADHD diagnostic criteria as a useful tool for clinical practice, but it also draws on a wider range of scientific research and perspectives not yet incorporated into DSM-5. Prior to publication of DSM-5, two of the researchers involved in revising the section on ADHD offered a symposium at an annual meeting of the American Psychiatric Association to describe to researchers and clinicians the progress of their committee. After discussion involving many questions from various researchers asking “Why are you not including this or changing that?” the chairman made an important point. He said, “You need to keep in mind that DSM does not lead the field; it follows it.” This book includes some cutting-edge research and clinical strategies that gradually will be tested and improved on by subsequent research.

Since publication of DSM-5 in 2013, several respected researchers have published criticisms and suggestions for how diagnostic criteria for ADHD could be improved in the next version (Barkley 2015; Fayyad and Kessler 2015). In the meantime, clinicians need to assess and treat patients using not only the guidance of DSM-5 but also their clinical judgment supported by the best they can glean from scientific research and from more experienced clinicians. The authors of DSM-5 itself note, “Diagnostic criteria are offered as guidelines for making diagnoses, and their use should be informed by clinical judgment” (American Psychiatric Association 2013, p. 21). This book is one resource to support that clinical work while we continue to look for greater understanding and more effective methods of treatment for children and adults with ADHD.



Basic Facts and the Central Mystery of ADHD

CURRENTLY, THERE IS CONSIDERABLE CONTROVERSY about attention-deficit/hyperactivity disorder (ADHD) in the media of the United States and in a number of other countries. In print, television, and online media, there are frequently alarmist warnings about the increasing numbers of children and adults being treated with medications for ADHD.

Even the usually reliable and objective *New York Times* has published sensationalized, negatively biased articles, such as the “Risky Rise of the Good-Grade Pill” (Schwarz 2012) warning about increasing numbers of high school students using or abusing ADHD medications as “academic steroids” to help them gain an unfair advantage in their schoolwork or on high-stakes tests such as the SAT. Although the article identified a problem of abuse that legitimately warrants concern, it made no distinction between the positive effects of stimulant medications properly used for treating an impairing disorder and the misuse of such medications, which can lead to addiction. Without such a distinction, warning quotes such as “Once you break the seal on using pills [stimulants],...it’s not scary anymore—especially when you’re getting A’s,” spoken by a teenager who abused stimulants and then became addicted to heroin, are

likely to frighten away parents whose children legitimately need and can benefit from medication for their ADHD.

Another sensationalized article appeared in the *New York Times* on December 15, 2013 (Schwarz 2013), warning about “The Selling of Attention Deficit Disorder.” That article quoted a psychologist who called the rising rates of ADHD diagnosis “a national disaster of dangerous proportions” and “a concoction to justify the giving out of medications at unprecedented and unjustifiable levels.” The author of the article suggested that advertising by pharmaceutical companies to parents has been the primary cause for the rate of ADHD diagnosis for children soaring to 15% from the earlier estimated rate of 5%. He implied that any increase from the earlier estimated rate of ADHD is a dangerous sign of excessive diagnosis.

Yet despite inadequately informed and negatively biased media coverage, the rate of diagnosis for ADHD and use of medications for this disorder has continued to increase not only in the United States but also internationally (Polanczyk et al. 2014). Many reports on the magnitude and rapidity of this increase appear to be exaggerated because they are based on simply asking people about who has been diagnosed rather than on medical records of careful evaluations (McKeown et al. 2015). Yet it is clear that increasing numbers of both male and female children, teenagers, and adults have been diagnosed with ADHD and have been receiving treatment for it over the past decade (Hinshaw and Scheffler 2014; Visser et al. 2014).

So why is diagnosis of ADHD and treatment with ADHD medications increasing so much in the twenty-first century? Is this increased rate of diagnosis of ADHD and increased use of ADHD medication actually due to careless diagnosis and aggressive promotion by pharmaceutical companies? In their 2014 book about this expansion, Hinshaw and Scheffler (2014) suggested multiple factors that may be fueling this increase:

- Escalating pressures for improved literacy and achievement from students in school and postsecondary education, as well as for enhanced work performance from adults whose jobs require more literacy and complex technical skills
- Increasing recognition that ADHD affects not just males but also many girls and women
- Accumulating evidence that ADHD impairments persist into adulthood for many, although not all, of the individuals who are affected in childhood
- Expanded access of some ethnic and racial minorities to resources for assessment and treatment for ADHD

- Increased awareness that some very young (e.g., preschool) children experience ADHD-related impairments and that early treatment can improve their ability to benefit from schooling

All of these factors are influential, yet the most fundamental reason for the escalating diagnoses and medication treatment of ADHD boils down to two simple and related facts:

1. ADHD can cause considerable impairment and significant suffering for affected individuals and families.
2. Medication treatments do not cure ADHD, but if appropriately administered, medication often can safely reduce impairment and improve functioning.

Persons with ADHD, even those who are very bright, tend to experience a wide variety of impairments in their ability to learn and to manage themselves in multiple activities of daily life: in their schooling, family interactions, and social relationships. For some, these impairments are extremely costly to them and their families, at least during childhood and/or adolescence and often also into adult years as they encounter challenges of employment, driving a motor vehicle, managing a household and finances, establishing and maintaining close relationships, and, for some, parenting. Medications for ADHD, adequately administered, do not cure, but often, although not always, they help to alleviate these impairments and can improve quality of life. Increasing numbers of persons in the United States and elsewhere around the world are discovering that untreated ADHD is damaging and that, for many, medication treatment for ADHD often works.

To fully appreciate why increasing numbers of individuals now want to seek treatment for ADHD, it is helpful to have an updated understanding of how scientific research has dramatically changed our understanding of this disorder. Research studies over the past 30 years have demonstrated that the disorder now known as ADHD is not essentially a disorder of misbehavior as it was understood in 1902. It is a complicated problem with the unfolding development and functioning of the brain's management system, its executive functions. It was not until 1980 that the term *attention deficit* was introduced into the name of the disorder now known as ADHD. And it was not until 1980 that psychiatric diagnostic criteria for ADHD began to include the possibility that for some children with these attentional difficulties, symptoms may persist into adulthood. Since that time, understanding of this complex disorder has rapidly expanded.

Scientific research has taught us much more about the nature, causes, course, and treatment of ADHD. Here is a summary of 12 important basic findings that are explained further in later chapters.

1. ADHD is now understood as the impairment of the brain's self-management system, which includes problems with getting motivated, organized, and started on necessary tasks; focusing on what needs to be attended to and shifting focus when needed; managing alertness and sleep; sustaining effort to complete tasks; processing and outputting information efficiently; managing emotions; using short-term working memory; and monitoring one's actions to fit the setting and avoid excessive impulsivity. (See Chapter 2.)
2. All the characteristics of ADHD are problems everyone has sometimes; however, individuals with ADHD simply have much more chronic and impairing difficulty with these problems. ADHD is not an all-or-nothing like pregnancy, where one either is or is not pregnant. It is more like depression. Everyone feels down sometimes, but a person who is simply unhappy for a couple of days does not warrant a diagnosis of clinical depression. ADHD comes in small, medium, and large levels of severity, but the diagnosis is reserved for those significantly and persistently impaired by their symptoms. (See Chapter 3.)
3. Although it is true that some children and adults with ADHD have significant problems with hyperactive and excessively impulsive behavior, many with ADHD have never had any significant behavior problems and have never been hyperactive. The majority of those who were "hyper" as children outgrow most of their hyperactive problems while continuing to have chronic difficulty with inattention and related problems. (See Chapter 3.)
4. ADHD is highly heritable; it runs in families. Twenty-five percent of children with ADHD have a parent with ADHD, and 30% have a brother or sister with ADHD. Twenty studies comparing identical twins, who share 100% of their genetic heritage, with fraternal twins, who share just 50% of their genetic heritage, yielded a heritability index of 0.75, indicating that most of the variability in developing ADHD is accounted for not by family environment but by inherited vulnerabilities (Faraone et al. 2005). Subsequent studies have demonstrated that this vulnerability is not due to any single gene; it is due to a large number of genes in combination. (See Chapter 6.)
5. Longitudinal and other imaging research has demonstrated significant differences in brain development and brain connectivity of children and adults with ADHD compared with typically devel-

oping individuals of similar age. Although much of brain development is similar, some specific areas of the brain that are important for self-management tend to mature about 3–5 years later in those with ADHD, and for some individuals, these problems persist for much of their life. (See Chapter 6.)

6. It was once thought that a child with ADHD would certainly outgrow the disorder sometime before reaching the age of about 14 years. However, longitudinal studies have shown that about 70% of those who have ADHD in childhood will continue to have some ADHD-related impairments at least into late adolescence. For many, but not all, impairments of ADHD continue throughout the life span. (See Chapter 3.)
7. ADHD is sometimes apparent during preschool years, but there are many whose ADHD-related impairments are not noticeable until they enter school or when they get into middle school, where they no longer have just one teacher to provide structure and control for most of each school day. Some do not demonstrate significant ADHD-related impairments until they enter high school or when they move away from home and must deal with the challenges of more independent life in college, university, or the early years of employment. Several studies have also shown that those with later onset of ADHD can be fully as impaired as those with earlier onset. (See Chapter 3.)
8. ADHD has nothing to do with how intelligent a person is. Some extremely bright and accomplished people suffer from ADHD despite high IQ. Studies have shown that ADHD is found in persons across the full range of intellectual abilities. (See Chapter 3.)
9. Emotions play two important roles in ADHD, neither of which is reflected in current diagnostic criteria. Conscious and unconscious emotions play a critical role in problems of motivation and self-regulation that are pervasive in ADHD. Also, many individuals with ADHD have chronic difficulty in recognizing and managing expression of their emotions. (See Chapters 2 and 5.)
10. ADHD is not just one or two specific symptoms. It is a complex syndrome, a cluster of impairments that often appear together, although some aspects of the disorder may be more or less prominent in any particular person. There are many differences among various individuals with ADHD, even those of similar age. Persons with ADHD are not all exactly alike in either their strengths or their difficulties. (See Chapter 2.)
11. Most children and adults who have ADHD also have difficulties from one or more co-occurring disorders at some point in their life-

times. The incidence of learning disorders, anxiety and mood disorders, sleep disorders, obsessive-compulsive disorder, substance use disorders, and autism spectrum disorder is considerably higher among those with ADHD than in the general population. Sometimes the co-occurring disorder is recognized and the ADHD is not. (See Chapter 7.)

12. Medication treatments do not cure ADHD, but for about 8 of 10 children and adults with ADHD, carefully managed medication treatment significantly improves ADHD symptoms for those parts of the day when the medication is active. These medications are not like an antibiotic that may cure an infection; they are more like eyeglasses that improve vision only while they are worn. (See Chapter 10.)

Central Mystery of ADHD

Despite the many differences among children and adults with ADHD, there is one similarity shared by virtually all of them. Although they have considerable chronic difficulty in getting organized and getting started on many tasks, focusing their attention, sustaining their efforts, and utilizing their short-term working memory, all of those diagnosed with ADHD tend to have at least a few specific activities or tasks for which they have no difficulty in exercising these very same functions in a normal or even extraordinary way.

Many children with ADHD who struggle painfully to focus on their schoolwork and daily chores are able to focus effortlessly very well for playing a favorite sport or video games. Many college students with ADHD earn top grades in one or two courses for which they have strong interest because of the content of the course or the skills and charisma of the professor, yet they fail out of college because they are unable to sustain their attention and effort for many other courses required for their curriculum. Many adults with ADHD are not promoted at work or repeatedly lose their jobs not because they do not do many aspects of their job quite well or very skillfully but because they are consistently unable to awaken themselves to get to work on time or because they are excessively forgetful about attending to important assignments or fail to hand in required reports accurately done before established deadlines.

Many individuals of all ages with ADHD demonstrate amazing ability to recall all the details of the story line of a movie seen years earlier, or words and music of countless songs they once heard, or random details of long-ago incidents they observed, yet they are often incapable of recalling what they have read or have heard just a few minutes ago. All in-

dividuals with ADHD tend to have a few tasks or situations where they demonstrate impressive or, at least, quite adequate competence in exercising various cognitive management skills that they are unable to exercise with consistency in most other activities of daily life, even though they see the importance of doing those tasks and very much want to perform them successfully.

Symptoms of ADHD are chronic, but in each person, they appear with notable exceptions, usually in situations where the person has strong personal interest in a particular task or activity or when they believe that something very unpleasant for them is likely to occur very quickly if they do not attend to this specific activity right here, right now. Clinical observations and empirical research have consistently demonstrated that ADHD symptoms are situationally variable and that there is much intra-individual variability in the symptoms of this disorder. This is the central mystery of ADHD.

A classic example of this puzzling paradox of ADHD is the situation of Larry, a sturdy, sandy-haired high school junior who was the goalie for his school's ice hockey team. It happened that the day before his evaluation, Larry had helped his team win the state championship in hockey by blocking many shots on goal. He was an extraordinarily fine goalie, and he was also a very bright student who scored in the very superior range on IQ tests. He wanted to get good grades because he was hoping eventually to go to medical school. Yet he was chronically in trouble with his teachers. Often they said to him, "Once in a while, you make very perceptive comments in class that show how smart you are, but most of the time you're out to lunch—looking out the window or staring at the ceiling. Occasionally, you turn in a really good homework paper, but most of the time you don't even know what the homework is supposed to be." The teachers kept asking Larry, "If you can pay attention so well when you're playing hockey, why can't you pay attention when you are in class? If you can work so hard to practice and stay in shape for hockey, why can't you show some consistent effort for your schoolwork?"

After hearing his parents tell me about these recurrent complaints from his teachers, Larry quietly responded,

I don't know why this keeps happening. I'm just as frustrated and even more worried about this than you are.... I know what I need to do and I really want to do it because I know how important it is for all the rest of my life.... I know I should be able to do it; I just can't! I just can't make myself pay steady attention to my work for school anywhere near the way I pay attention for hockey.

This inconsistency in motivation and performance is the most puzzling aspect of ADHD. It appears that the child or adult with ADHD who can show strong motivation and focus very well for some tasks should be able to do the same for most other tasks that they recognize as important. It appears as if this is a simple problem of lacking “willpower.” If you can do it for this, why can’t you do the same for that and that, which are even more important? However, ADHD is not a matter of willpower. It is a problem with the dynamics of the chemistry of the brain.

One of my patients once told me the following:

I’ve got a sexual example for you to show what it’s like to have ADHD. It’s like having erectile dysfunction of the mind. If the task you are faced with is something that turns you on, something that is really interesting for you, you’re “up for it” and you can perform. But if the task is not something that’s intrinsically interesting to you, if it doesn’t turn you on, you can’t get up for it and you can’t perform. It doesn’t matter how much you tell yourself, ‘I need to, I ought to.’ It’s just not a willpower kind of thing. (Brown 2005a)

Recent research offers considerable evidence that ADHD is not a “willpower thing,” even though, in many ways, it appears to be a simple lack of willpower. When individuals with ADHD are faced with a task that is really interesting to them, not because someone told them that it ought to be interesting, but just because it *is* interesting—because *to them at that moment* it either appears to offer appealing pleasure or seems to warn of some imminent unpleasantness that they want to avoid—that *perception, conscious or unconscious*, changes the chemistry of the brain instantly. This process is not under voluntary control.

If not under voluntary control, what does control the operation of executive functions? The answer to that question is primarily what Nobel prize-winning psychologist Daniel Kahneman (2011) refers to as the “automatic system” of the human mind, a system within the brain that he refers to simply as “System 1.” This system is not actually a structure of the brain, a clump of tissue that can be seen on an MRI (magnetic resonance image) as it is possible to see the cerebellum or hippocampus. The automatic system is the constantly shifting dynamic output function of neural networks that continually group and then reassemble in different transient groupings at lightning speed to bring together information from stored memories in response to whatever perceptions, thoughts, or imaginings arise and change moment to moment in an individual’s mind.

System 1 allows us to use past experience to help us recognize and respond to whatever we are faced with in any given moment. It is the

search engine for each individual's massive library of information and any related emotional valuations derived from that person's lifetime of experiences. The automatic system is the unconscious capacity of the brain to respond instantly to thoughts and perceptions pulling up whatever seems relevant from past experience to help us understand and respond to whatever we encounter in our thoughts, perceptions, and interactions with our environment.

Nicolelis (2011) has demonstrated that such operations of the brain are composed not of single strings of neurons but of large interacting ensembles of neurons that respond to perceptions, thoughts, and imaginings by arranging and rearranging themselves and eliciting other neuronal ensembles to communicate with one another transiently to facilitate thoughts, emotions, or actions. Within milliseconds, such ensembles can mobilize and respond to stimulation by using low-voltage electrical messages facilitated by neurotransmitter chemicals manufactured in each neuron to facilitate these interactions.

Kahneman's (2011) discussion of System 1 recognizes that the brain also has a second system, which he refers to as the "effortful" or "attentive" system. This "System 2" is a more conscious operation of brain neuronal networks, which tend to be relatively much slower and more deliberative, the processes invoked when we need to make comparisons or are uncertain about what to do or how to do something that is unfamiliar or challenging. He argues that both of these systems are active whenever we are awake:

System 1 runs automatically and System 2 is normally in a comfortable low-effort mode in which only a fraction of its capacity is engaged. System 1 continuously generates suggestions for System 2: impressions, intuitions, intentions, and feelings.... When all goes smoothly, which is most of the time, System 2 adopts the suggestions of System 1 with no modification.... System 2 is mobilized when a question arises for which System 1 does not have an answer. (p. 24)

Kahneman (2011) emphasizes that System 1 is the origin of most of what we do.

Our thoughts and actions are routinely guided by System 1 and generally are on the mark. One of the marvels is the rich and detailed model of our world that is maintained in associative memory.... (System 1) holds the vast repertory of skills we have acquired in a lifetime of practice, which automatically produces adequate solutions to challenges as they arise. (p. 416)

The main point here is that executive functions operate automatically most of the time, guided by unconscious activities of the brain that

are based on the specific individual's memories and priorities; these are shaped by previous life experiences and that individual's current situation as he or she perceives it. More information about how ADHD impacts these operations that shape the brain's "googling" for motivation is provided in Chapter 5 ("How ADHD Impacts 'Brain Googling' for Motivations").

In Chapter 2 ("A New Model of ADHD"), I provide more information about the nature, causes, and various ADHD-related impairments over the course of the life span.

Summary

Despite controversy and considerable misinformation about ADHD in the media, the rate of ADHD diagnosis and use of medication for this disorder has significantly increased in the United States and internationally. The most fundamental reasons for this are that 1) ADHD can cause considerable chronic impairment and suffering for affected individuals and families and 2) although medication treatments do not cure ADHD, if appropriately administered, they can safely reduce impairment and improve functioning.

This chapter states 12 important science-based findings about ADHD as complex impairment of the brain's self-management system; these findings are more fully explained in subsequent chapters. The chapter also highlights the central mystery of ADHD—that those with ADHD are able to function quite effectively when engaged in a few specific activities or tasks that interest them, utilizing those same self-management functions that are chronically impaired for most other activities. This is explained in terms of the brain's "automatic system," which is not determined by "willpower."



A New Model of ADHD

Executive Function Impairments

SCIENTIFIC RESEARCH OVER THE PAST 30 YEARS

has brought a major change in our understanding of the disorder currently known as attention-deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD). Findings from clinical and neuroscience studies have brought a fundamental shift from the earlier notion of ADHD as a disruptive behavior disorder of young children to a substantially new model. This new paradigm recognizes that ADHD affects not only young children, both boys and girls, but also many adolescents and adult men and women. It substantially expands the concept of attention and portrays ADHD as a complex, often inherited, syndrome of impairments of the brain's cognitive management system, its executive functions. It is hoped that ADHD eventually will be renamed executive function deficit disorder (EFDD) to reduce confusion and to recognize the full scope of what science has discovered about this complex disorder (Barkley 2015).

Some who hear this description of ADHD as “impaired executive functions” think that ADHD is caused by impaired executive functions. That is a misunderstanding. When we say that ADHD is a syndrome of impairments of executive functions, we mean only that the essential difficulties—the impairments—that characterize the disorder are a cluster

of chronic difficulties with the brain's self-management system. These difficulties are the *characteristics* of ADHD, *not the causes* of the disorder, just as severe chest pain, irregular heart rate, and shortness of breath may be characteristics of a heart attack but are not the cause of a heart attack.

Recent scientific research has brought forth evidence that for many people the problems of ADHD are associated with inherited differences in the development, structure, and functioning of the brain. It is likely that there are a variety of different physiological factors that can contribute to various profiles of executive function impairments that characterize ADHD. This is discussed further in Chapter 6, "How ADHD Develops, Sometimes Gets Worse, and Sometimes Improves."

Impairments of ADHD sometimes become apparent during very early childhood, in preschoolers who are far more restless and impulsive than most others of the same age. Frequently, these children have chronic sleep difficulties, are excessively irritable, and, in some cases, are exceptionally aggressive toward peers and younger siblings. They are much more difficult for parents and other caretakers to take care of and to keep safe than most other children of similar age.

For many others with ADHD, their impairments do not become apparent until they meet the challenges of the early years of schooling, when they are expected to participate in structured group activities and are challenged to learn new concepts and skills while also learning to relate to new adults and peers of various ages. Still others do not demonstrate ADHD-related impairments until they advance further in their schooling and must deal with multiple teachers, frequent changing of classes, and increasing demands for more independent work in middle and high school. For some, their parents provide such effective scaffolding support that their ADHD-related impairments are seen only as they move away from home to meet the challenges of college, getting and keeping a job, and other demands of adult life.

This new model asserts that ADHD is a syndrome of impairment of executive functions: clusters of dynamic, interacting cognitive functions of the brain that are critical for most aspects of self-management. Many components of the brain are essential infrastructure for executive functions. These include the prefrontal cortex in the front of the brain, the limbic circuits deep in the midbrain, the cerebellar region near the back of the brain, and many others. Data from recent neuroscience research have shown that the impairments of ADHD are malfunctions not so much in any one specific area of brain but in communications between widely distributed neural networks that support instantaneous interactions of various regions of the brain that activate and rapidly coordinate countless thoughts, memories, and actions (Cortese et al. 2012).

In many instances, ADHD appears as a developmental impairment of executive functions. This means that for many who have ADHD, their executive functions do not mature, do not come “online,” to function consistently as would be expected for most others of similar age. Sometimes, individuals catch up with peers within a few years; in other cases, the developmental delay persists much longer, or, if not treated adequately, the impairment of executive functions may persist throughout the individual’s lifetime (Shaw et al. 2007, 2012).

Developmental delay is not the only way executive functions can become impaired. These cognitive functions can become impaired by trauma in a head injury or by disease such as Alzheimer’s disease, but most individuals whose executive functions are damaged by injury or disease had adequate executive function and lose it as a result of damage to brain tissue. For many of those with ADHD, the executive functions have not developed within the usual time frame. Those with ADHD are very significantly delayed in these specific but important functions when compared with the vast majority of their peers. They may have many impressive talents, but they have significant impairments in important aspects of self-management.

Executive functions are those capacities of the brain that allow a person to recognize the tasks that he or she needs to do, to be motivated adequately for doing those necessary tasks, to plan for and organize how to accomplish the tasks, to initiate the various components of the task without excessive delay, and to sustain effort and actions needed to complete the essential tasks. Neuropsychologist Muriel Lezak noted, “Questions about executive functions ask *how or whether* a person goes about doing something (e.g., Will you do it and, if so, how and when?)” (Lezak et al. 2004, pp. 35–36).

In early childhood, only very elementary aspects of executive functions are developed. Examples include learning to brush one’s teeth, to dress oneself, or to pick up one’s toys without direct step-by-step instruction from an adult each time. Throughout childhood, adults, older siblings, or other individuals provide considerable direct instruction in each instance to help the child successfully execute such task sequences. Initially, parents or other individuals facilitate this learning by doing the task for the child; they then progress to talking the child through the task, assisting as needed. Eventually, typically developing children gradually learn to do such tasks with a simple reminder to start the sequence. With similar parental guidance, most children gradually learn to interact appropriately with others, to safely cross a street, to ride a bike, and, eventually, to drive a motor vehicle.

Similar sequences of learning within the scaffolding of direct modeling, close supervision, and practice can enable most children to develop their capacities to self-manage a rapidly expanding progression of

tasks of self-care, social interaction, and academic skills required for daily life. As the child develops the capacity to initiate, self-manage, and adequately execute the progression of such tasks, he or she is demonstrating development of very elementary stages of executive functions and is progressively building the foundation for learning additional skills to self-manage the tasks of daily life.

Various models have been offered to describe the cognitive functions involved in executive functions (Barkley 2011, 2012a, 2015). Figure 2–1 is one such model. It includes six clusters of related cognitive functions that interact dynamically for self-management. The boxes of the diagram do not represent parts of the brain; rather, they show various types of functional activities of the mind, each of which involves multiple aspects and neural networks of the brain. Explanation and elaboration of these clusters are provided in the following subsections.

Executive Functions Impaired in ADHD

Activation: Organizing, Prioritizing, and Activating to Work

Many persons with ADHD report chronic difficulty in organizing their stuff. Students with ADHD often have excessively disorganized notebooks, desks, lockers, and living space, unless someone else is helping them keep their things organized. Adults with ADHD often report chronic difficulty in keeping track of their bills, correspondence, financial records, clothing, and household supplies.

Others with ADHD have no difficulty in organizing their stuff, but they have chronic problems in prioritizing and organizing their time and their work. A young student may spend hours on a Tuesday evening making an elegant cover for a social studies report due the next day without attending to the fact that the report itself has not yet even been started. Often, individuals with ADHD say that if they have many tasks to do, all those tasks seem equally important; they find it very difficult to assign priorities, to determine which task needs to be done first, second, third, and so on. For example, they might find it difficult to decide between cleaning out a cluttered closet and getting started on preparations for a dinner they need to have ready for guests in less than hour.

Even when they are able to establish clear priorities, persons with ADHD too often delay starting tasks they need to do. One example is an attorney who sought consultation.

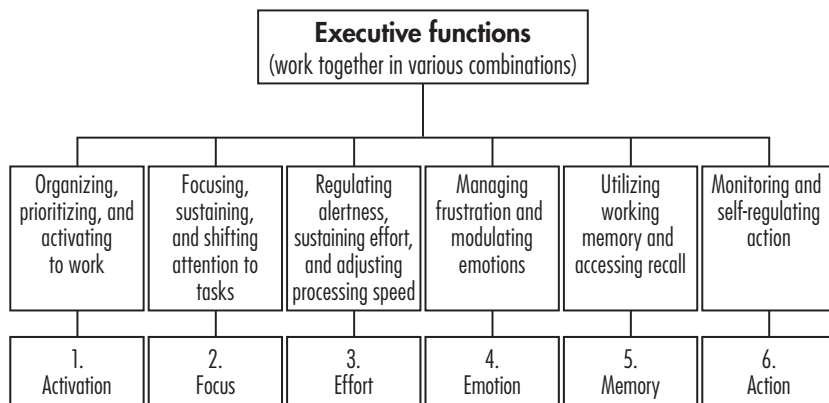


FIGURE 2–1. Executive functions impaired in attention-deficit/hyperactivity disorder.

Source. Brown 2001.

All my life, I've had trouble getting started on my work when I have to work by myself. I have no trouble talking with clients or working with our secretaries or other attorneys, but when I have paperwork to do, I have great difficulty getting started.

Twice each week, I set aside several hours to do paperwork that I want to get done and need to get done because I'm not going to get paid until it's completed. I'm in my office with the door closed. Nobody is bothering me, and the secretary can cover the phone. I have all the stuff I need right in front of me, and I don't touch it. I turn on my computer and check my e-mails. Then I write a few notes to various people. Then I get on a couple of news sites to see what's going on in the world. Then, magically, a video game appears on my screen, and I spend several hours playing that. Then I go home, and my work is still not done. I get home, get something to eat, watch a little TV, and then, about 10 P.M., it occurs to me, "Oh, my God. I've got that report to get done tonight. If I don't get that in by 8 A.M., I'm going to be in very serious trouble at work tomorrow morning." Then I finally get started on my home computer, work consistently until 2 or 3 A.M., and produce an excellent report. But that's a hell of a way to live.

Everybody struggles with deadlines once in a while; individuals with ADHD often cannot get started on a task until it becomes an emergency. They have much difficulty in motivating themselves to get started on many tasks unless that specific task is especially interesting to them, or unless they expect that something very unpleasant will happen to them very soon if they do not get the task done right here, right now.

Focus: Focusing, Sustaining Attention on Tasks, and Shifting Attention When Needed

For persons with ADHD, it is often difficult to focus on a specific task and sustain their attention on that task. When they are reading or writing or participating in a conversation, class, or meeting, their minds repeatedly drift off to think of other things that have nothing to do with the focus they are trying to keep. They work at the task or follow the conversation for a bit, and then someone drops a pencil and they must look to see where the pencil landed, and then they get back to the task. A few moments later, they are thinking about some TV show they recently watched, then after a few minutes they get back to whatever they were doing. After a few more minutes, they remember a telephone conversation they had a few hours ago. After a few minutes, they regain focus on the task, and then their eyes drift over to look out the window as anyone else does from time to time, but they are likely to look longer to check out the traffic and the cloud formations and pedestrians walking down the street. They resume their focus on the task, and they then start wondering, "When is this damn thing going to be over?" As they start thinking about what they are going to do when this task is finished, they may think, "I need to call Helen when I get home," or "I wonder what we're having for supper tonight." Or "I still haven't heard anything back from Jack about the e-mail I sent him last week. Wonder what's up with him? When was the last time I saw him? Oh, yeah, we went to see that movie together. That was a pretty good movie. When I get home, I should check out what's playing this weekend; maybe we can go catch another good one." People with ADHD often say that in their mind it is as though they have five different TV stations, all coming in on one channel at the same time. It is very difficult for them to separate the signal they are trying to focus on from the mental "noise" that accompanies it.

Addressing this focusing problem in ADHD does not mean locking attention continually on just one specific item. It is not like holding a camera still to focus on just one object to take a picture. It is more like what we do when we focus on our driving. When driving a car, we do not simply stare at the bumper of the car in front of us. We look at that car, but we also look down the street to notice that the traffic light is changing from green to red, so we move a foot from the accelerator to the brake. We also gaze frequently at the rearview mirror to see what is coming up from behind, and we watch a truck that is backing out of a driveway into the street. At the same time, we notice a few pedestrians running across the street to catch an approaching bus, and we plan to get into the next lane so we can prepare to make a left turn at the next

corner. While doing all this, we may be thinking about what we are going to buy when we get to the grocery store.

When focusing on our driving, we are shifting the focus of our vision and attention across multiple aspects of what is around us as we move along the street, keeping in mind what we notice as potentially important and ignoring distractions that are not currently significant. If we notice any objects or movements that are unusual or may create a problem, our attention focuses instantly to reassess that situation while we still keep in mind the larger shifting picture of where we are and what we are doing as we drive the car down the street.

Effort: Regulating Alertness, Sustaining Effort, and Adjusting Processing Speed

Many people with ADHD complain of chronic difficulties in regulating their sleep and alertness. They might say the following:

Often, I stay up a lot longer than I really want to or should because I've found that if I try to go to bed before I'm really exhausted, I can't shut my head off; I just keep thinking about stuff. So I stay up late reading or watching TV or using the computer until I'm fully exhausted, and then I can fall asleep without much trouble.

Yet these same people often complain that once they fall asleep, they tend to sleep like dead people and have much difficulty in waking up. Often, they report that they are unable to hear and respond to an alarm clock or that they hit the snooze button repeatedly or simply turn off the alarm and go back to sleep unless they have someone who is available and willing to help them get up and out of bed. Without such help, they are quite likely to show up late or completely miss school, work, or any other commitments that they actually want to and need to be present for.

During the day, they are usually OK so long as they are walking around or talking a lot. But if they have to sit still for a long time to read or listen to a lecture or attend a class or meeting, their eyelids tend to get heavy, and they feel drowsy as they fight off falling asleep.

Another struggle for many with ADHD is illustrated by a university student who was a runner on the track team:

My mind is a great sprinter, but it's a lousy distance runner. If the task I have to do is something where you can go all out and finish it in one chunk, I'm fine. But if it's a longer-term project, something you can't complete in one quick chunk, something you have to do a bit at a time, day after day, that's much more difficult for me. Typically, either I rush to get the damn thing done as quickly as possible or I just put it aside, saying I'll get to it when it becomes more of an emergency.

One particular dilemma for many individuals with ADHD involves expository writing. If they must write a book report or an essay or a long letter or report, they often get stuck. They may have many good ideas to write about, but they have a lot of trouble organizing what they are trying to write and figuring out which are the most important points, which are more subordinate, which are supportive, and which are irrelevant. They have a good deal of trouble organizing their ideas, and they tend to be very slow arranging ideas in sentences and paragraphs. One person described this as somewhat like having a good computer and a very slow modem. Their processing speed for writing is snail-like. It is painfully slow for them to get their ideas out on a page. Often, what they finally write is quite well done, but for many, the completion of the writing task is so burdensome that they keep putting it off until the very last minute, and they may not complete it at all.

This difficulty with expository writing is just one example of slow information-processing speed. Many individuals with ADHD find that it takes them much longer than others of comparable age to process and act on information. A first-grader with ADHD may need twice as long as classmates to copy two simple sentences off the blackboard. High school or college students with ADHD may have much more difficulty than classmates in taking adequate notes from a teacher's lecture. They may be struggling to write down important points from the first sentence they heard while others are already completing notes on the third or fourth point being mentioned.

Some of these students are very quick, perhaps even "hyper" in their actions and physical movements, yet they tend to be quite slow in transforming information they have heard or even their own thoughts into sentences and paragraphs. They may process information very well but quite slowly.

Emotion: Managing Frustration and Modulating Emotions

Although current diagnostic criteria for ADHD do not include any items related to managing emotions, there is an increasing body of research indicating that many people with ADHD have much difficulty in managing their emotions, particularly impulsive emotional reactions to frustration (Barkley and Fischer 2010; Surman et al. 2013). Often, they complain of chronic difficulties in managing frustration, anger, disappointment, desire, or worry. They speak about how these emotions take over their thinking in the same way a computer virus invades a hard drive, making it impossible for them to think of anything else. Some in-

dividuals with ADHD struggle to manage a wide range of emotions; others are more vulnerable to difficulties with just one or two, such as anger or worry. Two different examples of persons with ADHD who reported chronic difficulties with managing a variety of emotions are presented here.

A salesman told of his experience having a late lunch in a local diner.

There weren't many people in the diner; it was late afternoon. I was in a good mood eating my soup, when a guy sitting in the booth behind me began chewing his sandwich very loudly, "chomp, chomp, chomp!" There was something about that noise that was driving me nuts. It invaded my mind like a computer virus invades a hard drive—taking up all of the space. All I could think of was that noise! My fist clenched, and I was seriously thinking about smacking this guy in the mouth. I didn't do it; I didn't want to get arrested. Then after a few minutes, he was still making the same noise, but at that point it didn't bother me anymore.

That sort of thing happens to me often. Some little frustration that on a scale of 0 to 10 most people would rate as a 0 or a 1 can hit me like a 7 or an 8 or a 9! I feel like punching somebody or breaking something. Then, in just a couple of minutes, it usually goes away.

He then went on to say,

It's not always like that. Today I was walking down the hall at work, and a friend of mine who works in another department came around the corner and was walking toward me while he was reading some papers. I hadn't seen him for a long time, so I stopped and said, "Hi, how've you been?" He looked up, said, "Hi," and then put his head down and kept on walking. Most people would blow that off in a second. They'd just say, "He's probably in a hurry to get to a meeting or something. We can talk later." Not me! That happened at lunchtime and I didn't get anything done all afternoon. I spent the whole afternoon thinking, "Did I do something to piss him off?" Or maybe I offended somebody in his department, and they're all mad at me. Or maybe I'm just a person nobody likes, and nobody will tell me about it.

Other people with ADHD do not have problems with emotions, but they do have problems when they get an idea about something they want to get, something they want to buy, or something they want to do. They get the feeling "I have to have it *now*!" And they do everything they possibly can to get it now. It does not matter to them how much the item costs, or how much it is going to make a problem for them or for someone else, or whether they are using time or money now for this item when they know they need to use the time or money for something else that is more important tomorrow. They just do everything they can to get whatever it is they feel they must have now. And they keep that up until either they get it or

they hit a brick wall. But even if they get it, often they are not satisfied because soon they are on to something else they want.

Some others do not have problems with wanting something immediately, but they worry a lot. One woman described an experience driving on an expressway:

I was in the left lane driving along next to the Jersey barrier, and there was an 18-wheel truck cruising in the lane beside me. He started to move over a little toward me; he didn't get into my lane, but it got me to thinking—what would happen if he didn't see me and pulled into my lane and squished me and my car? Soon I wasn't just thinking about it; I was running a very vivid movie in my head. I pictured how he could smash into my car and squish me against the Jersey barrier. I thought of how the car would be crumpled and sharp pieces of metal would be sticking into me and I would be bleeding to death. And the truck would be dragging the car along against the barrier, and then it would jackknife, and we'd be getting hit repeatedly by other cars and trucks. And there would be a massive traffic jam, and it would take a long time for the rescue squad to get there to cut me out of the car. And by the time they got me out, I would have bled to death; they would have to call my family and tell them I was dead. All this was running in my head while I was trying to drive my car 65 miles an hour down the expressway! That sort of thing happens to me a lot, where everything is going along fine and I start thinking, "What if this happened? Or what if that happened?"

It is not that everyone with ADHD has all of these problems with emotions, but many have at least one or two of them. Whether it is getting really irritated about some little thing, or thinking too much about having had one's feelings hurt by someone, or getting that intense feeling of "I've got to have it now!" or wondering "What if this or that might happen?"—in each case, that emotion can gobble up all the space in the person's thoughts like a computer virus can gobble up all the space on a hard drive. And it is very hard for those people to put the emotion into perspective, into the back of their minds, and move on with whatever they need to do. For a while, the problematic emotion just floods their brain.

This flooding with an uncomfortable feeling is not the only way emotions are problematic for persons with ADHD, but managing such emotions is one aspect of executive functions that tends to present chronic difficulties for many with ADHD. Other ways emotions are involved in ADHD are discussed in Chapter 5 ("How ADHD Impacts 'Brain Googling' for Motivations").

Memory: Utilizing Working Memory and Accessing Recall

When asked "How is your memory?" people with ADHD often answer that they have a very good memory, the best in their family; they can re-

member things that no one else in the family can recall. They may be able to tell in detail the entire story line of a movie they saw just once more than 10 years ago. Or they may recall almost every play that was run when they watched the Super Bowl 2 years ago. They may be able to recall all the music and all the words of every verse of hundreds of songs that were popular many years ago. Yet despite their having excellent recall of some things from a long time ago, often they are unable to recall something that happened just a few minutes ago.

The problem with memory in ADHD is generally not with long-term storage memory. The difficulty is usually with short-term working memory. Working memory is what helps us to keep one thing in mind while we are doing something else. This is the aspect of memory that makes it difficult when you call to get a phone listing and do not have paper or pencil to write it down. In that situation, many persons with ADHD tend to mix up the numbers, unable to keep them in mind long enough to dial the call correctly. Working memory is what fails us when we go into another room to get something and then cannot remember what we came to get. It is what causes a problem when we go downstairs to get something needed to do a project and then see something down there that is interesting or that needs doing, and soon we get involved in project number two, completely forgetting that we had been working on project number one upstairs and needed to get it done.

Working memory failure is involved when a student raises his or her hand to give an answer to a question the teacher has asked the class and then has to wait because the teacher calls on someone else first. Moments later, when the teacher asks, "Yes, what were you going to say?" the student has to say, "Sorry, I forgot what I was going to say, and now I've even forgotten what you were asking us. Could you repeat the question, please?" This is the same problem that may afflict a person who is thinking of five things he or she needs to take along when he or she goes out and then half an hour later is able to remember only one of the five items and cannot recall the other four, even to save his or her life.

Many individuals with ADHD have memory problems with reading, especially if what they are reading is not particularly interesting to them. They can read pages of text and understand every word as they read it, yet a few minutes later they do not have the foggiest idea of what they have just read.

But there is also another way in which working memory often fails persons with ADHD. Working memory is the search engine for the brain, instantaneously pulling up various thoughts, memories, and images that may be relevant to what we are noticing or thinking about or doing. Often, students with ADHD will study the night before an exam

and then have someone quiz them on what they have studied. They may know all the answers quite well and go to class the next day expecting to get a very good grade on the exam. But as they are taking the exam, a lot of what they knew so well the night before just evaporates and they cannot pull it out of their head when they need it for the exam. However, a few hours or a few days later, something may jog their memory, and all that they were unable to recall earlier comes back without any further studying. It is as though their brain's search engine was simply unable to recall what was needed when it was needed. The problem is not that they failed to learn the information. They learned the information but were unable to retrieve it when they wanted it.

Action: Monitoring and Self-Regulating Action

Activity level varies a lot among persons with ADHD. Some individuals are quite hyperactive and impulsive when they are very young, constantly wiggling around, finding it hard to sit still or to remain seated, or to stop talking and making various noises. For most, that hyperactivity and impulsivity gradually settles down as they get into late childhood or early adolescence. There are some who remain very hyperactive even into adulthood. It is as though they have only two speeds: full speed ahead or asleep, without much in between. They seem unable to stop talking or wiggling or playing with various objects in their hand. Many with ADHD are like most others of the same age, sometimes active, sometimes not. There are some who are quite sluggish and tend to be like "couch potatoes." It practically takes dynamite to get them moving to do anything.

Being too fast or too slow in moving around is not the only type of action that is often problematic in persons with ADHD. Other problems include excessive physical activity, excessive verbal activity, or excessive impulsivity, jumping into action without adequately considering the potential consequences. Many tend also to be too quick to speak or too fast to jump to conclusions. Often, they act impulsively without considering potential consequences, or speak out as though they have no filter, or are simply rude. This may take the form of interrupting others who are speaking or otherwise occupied, blurting out whatever they want to say regardless of how impolite or intrusive it might be. Sometimes, it might involve being harshly critical of another person's appearance or making remarks without considering how they might be hurtful or provocative.

For children, problematic action may mean crossing a busy street without first looking for oncoming traffic. For adults, it may involve driving too fast for road conditions or frequently exceeding posted

speed limits simply because one is in a hurry or passing other cars in a dangerous way because one is impatient with those driving slowly. Or it may be shooting off one's mouth with a harsh comment about someone else without considering how hurtful the words may be. For adults, it may be making a quick decision to buy something that looks appealing without considering whether they can really afford to pay for it.

Often, what is lacking when taking an action is adequate monitoring of oneself and the situation—noticing when someone else is busy or paying attention to road conditions and traffic rules while driving—looking at the context or the bigger picture rather than simply acting on whatever feeling or inclination occurs at the moment. Often, persons with ADHD report that they are told by others that they do not know when to stop monopolizing a conversation or that they come across as though the words they want to speak are always more important than those of anyone else. In other situations, the problem may not be so much monitoring the present situation but simply acting without sufficient forethought about what effects may follow later.

This self-monitoring involves more than the moment-by-moment monitoring required in crossing a busy street, participating in a conversation, or driving a car. It also involves longer-term self-monitoring, such as filling the gas tank before the car is running on fumes, keeping track of how much money one has in the checking account before writing a check, and considering how many commitments one has for the coming week before deciding whether to accept an invitation or take on an additional errand or project. It involves remembering to respond to a phone call or to thank someone for a gift received. For students, self-monitoring includes keeping track of when a longer-term assignment will be coming due so it is not left undone until the last minute or making the time to begin studying for an exam early enough to be adequately prepared. Many of these examples illustrate how monitoring one's actions is closely intertwined with other executive functions such as utilizing working memory, setting priorities, and getting started.

Dynamic Interactions of Executive Functions

Although the model of executive functions depicted in Figure 2–1 shows six separate boxes, each with its own label, these functions are not separate unitary functions. They are not like height, weight, or blood pressure, each of which is a unitary variable. Each of these clusters should be thought of as a collection of related cognitive functions

that interact in various ways simultaneously. Think of carrying on a conversation, driving a car, or preparing a meal. Each of those tasks requires a flow of quickly recalling, organizing, and prioritizing thoughts and plans and aims and actions; getting started while monitoring what is going on; and making small or substantial changes in timing and actions according to the quickly changing needs of the moment.

Most of the time, these dynamic processes are not separately deliberated and thought out piece by piece. They flow unconsciously—unconscious not in the psychoanalytic sense of repression but in the more modern sense of *automaticity*. They move so quickly that there is no time for deliberating unless the action must be stopped because of some unforeseen problem or interference that disrupts the process and requires more deliberation before further action. Examples are when a conversation takes a totally unexpected turn or is interrupted by some unrelated event, when a driver is suddenly confronted with another vehicle cutting into traffic or unexpectedly slowing down or when an emergency vehicle's siren requires pulling to the side of the road, and when the cook suddenly notices that a pot is boiling over while a ringing telephone demands attention.

This automaticity is seen in the seamless movements of a basketball player who dribbles the ball down the court and approaches the basket to attempt a layup shot. That player is not saying to himself, "Now I move my left foot forward, next I move my right foot forward, now I move to the left around this defender, now I drop my left shoulder and lift the ball with my right hand, now I turn my head slightly and push the ball up to make the shot." Those movements and many others are integrated and executed quickly and smoothly in sequence, while at the same time the player adjusts to changing positions and movements of other players encountered in the approach to the basket. Executive functions operate in dynamic interaction, usually without much conscious thought or deliberation.

Summary

In this chapter, I describe a six-factor model of the brain's self-management system, its executive functions. These factors are 1) **activation**, organizing, prioritizing, and activating to work; 2) **focus**, focusing, sustaining, and shifting attention to tasks; 3) **effort**, regulating alertness, sustaining effort, and adjusting processing speed; 4) **emotion**, managing frustration and modulating emotions; 5) **memory**, utilizing working memory and accessing recall; and 6) **action**, monitoring and self-regulating action.

These executive functions work together dynamically via rapidly regrouping interactive neural networks of the brain.

These six clusters of executive functions are those capacities of the brain that allow a person to recognize tasks they need to do, to be motivated adequately for doing necessary tasks, to plan and organize how to accomplish tasks, to initiate the various components of the task, and to sustain effort and actions needed to complete essential tasks. Examples in the chapter illustrate how developmental delays related to ADHD can impair these functions, which operate unconsciously.



Differences Among Persons With ADHD

WHEN LOOKING AT THE LIST OF SYMPTOMS OF attention-deficit/hyperactivity disorder (ADHD), many people recognize problems that are not uncommon. They exclaim, “Oh, I have all these problems too. So does everybody else. How can this be any big difficulty to anyone?” The answer to that question is simple. It is a matter of how often and how much these difficulties interfere with the person’s life—how much these problems are impairing to the person. All of the symptoms that characterize ADHD are difficulties everyone has sometimes. Persons are legitimately identified as having ADHD only if they experience significant and persistent impairment from ADHD syndrome consistently for a long time.

ADHD is not an all-or-nothing category like pregnancy, where one either is or is not pregnant, with nothing in between. It is more like depression. Everyone has some times when they feel sad and unhappy, but we do not diagnose someone as clinically depressed simply because he or she has been unhappy for a couple of days. It is only when a person has been seriously impaired by depressive symptoms that have persisted for a significant period of time that he or she may be diagnosed legitimately as being clinically depressed. Persons with ADHD experience much more persistent and significant impairment than do persons who do not have ADHD.

Persons with ADHD have similar impairments and share a similar cluster of symptoms, but people with ADHD are certainly not all alike, even in aspects of their ADHD-related impairments. There are many ways in which persons with ADHD differ from one another. This diversity among groups of persons with a similar diagnosis is increasingly being identified in psychiatric research as important for recognizing how various traits identified as problematic tend to vary within the normally functioning population as well as within any specific diagnostic category (e.g., Marquand et al. 2016). In this chapter, I describe eight of the many ways in which those with ADHD may differ from one another. There are two other important differences among those with ADHD that are addressed in subsequent chapters: the impact of age differences is described in Chapter 4, “Ways ADHD Can Impair Functioning at Various Age Levels,” and differences created by co-occurring disorders are discussed in Chapter 7, “How and Why Other Disorders Often Co-occur With ADHD.”

Differences in Severity of Impairment

Even within the range of impairment sufficient to warrant diagnosis, ADHD comes in small, medium, and large. Persons with this disorder vary in terms of how much their ADHD problems interfere with or reduce the quality of their daily life—how they are able to work in school or do their job or get along with their family and other people.

For some individuals, their problems with ADHD symptoms are relatively mild, clearly more problematic than for most persons of similar age yet not very noticeable except in certain situations or only to the people closely involved with them on a daily basis. For example, these individuals may perform well in most aspects of their jobs, yet their personal finances may be disorganized because of chronic inability to keep track of their bills and their taxes and a tendency to make many impulsive purchases that exceed their financial means. A person who is a productive worker in his business may be a careless and impulsive driver who speeds excessively and routinely violates basic rules of the road, endangering himself and others.

For others, impairments of ADHD are moderate, often causing significant frustrations and difficulties in their studies or employment and disrupting their interactions with others, yet they still function in many situations without being severely incapacitated. A student may earn high grades in a few classes in which she has strong interest while ig-

noring assignments and violating attendance requirements in so many less appealing courses that she is forced to withdraw from a course of study because of an excessively low grade point average. Yet that same student may be extremely efficient and reliable in working at her part-time job in a restaurant.

Unfortunately, there are also some individuals whose ADHD-related impairments are much more obvious, more pervasive, and more destructive. Because of their severe ADHD-related impairments, they experience repeated failures in school and are unable to maintain steady employment because of excessive absences and lateness, failure to complete work tasks on time, and chronic forgetfulness about instructions from supervisors. They may be in chronic conflict with coworkers, family, and friends, frustrating and annoying others so much that many of their relationships are damaged or disrupted by their ADHD-related tendencies to be too outspoken or to neglect commitments to others.

For some persons, their ADHD impairments are worsened by complicating factors such as excessive drinking or drug use, episodic depression, or repeated poor choices of friends or partners. Some others suffer persisting economic misfortunes or multiple illnesses or injuries. Others struggle with the complicated and persisting burdens of caring for various family members impaired by mental, physical, or economic difficulties. However, some are also fortunate in developing successful relationships with a partner, employer, or mentor who is able to provide resources and support to help them develop their strengths despite the impairments of ADHD. And some sooner or later are able to obtain and benefit from effective treatment that helps to alleviate their ADHD symptoms while they develop their personal strengths.

Differences in Intensity of Hyperactivity and/or Impulsiveness

For many decades, the syndrome now identified as ADHD was understood simply as a chronic problem with disruptive behavior, mostly in little boys who could not sit still, would not behave, and were far more careless and annoying to parents and teachers than most other boys of the same age. Common stereotypes of those with ADHD characterize them as constantly restless and in perpetual motion and quick to speak or to act impulsively, without enough attention to potential consequences. Early descriptions of the disorder did not say much about it as a problem with attention. In fact, it was not until 1980 that the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) introduced the term

“attention deficit” into its name for this disorder and recognized that it can occur with or without excessive hyperactive behavior (American Psychiatric Association 1980).

More recent research-based understandings of ADHD recognize that many of the individuals diagnosed with ADHD have never had any significant behavior problems and have never been hyperactive. On the contrary, a large number of those with ADHD tend to be more sluggish and struggle to mobilize themselves to do what needs to be done. Some researchers have suggested that those whose attentional problems are characterized by considerable sluggishness ought to be seen as having a disorder distinct from ADHD (Barkley 2015). However, persons in this more sluggish group seem to be just a more extreme variant of the predominantly inattentive type of ADHD.

Even individuals who are quite impulsive and hyperactive during early childhood usually tend to become much less “hyper” and impulsive as they enter later childhood or early adolescence. Typically, however, their attentional difficulties persist or sometimes increase as they encounter the increasing demands for self-management that emerge and multiply from mid-adolescence and throughout adulthood. However, impulsiveness is not limited to quick movements and actions. Many individuals with ADHD who are not too quick to speak or act report that they are often impulsive in the way they think, that they tend to be too quick to jump to conclusions.

Differences in Age at Onset of ADHD Symptoms

For many years, and still in some parts of the world, ADHD has been understood as a problem seen only in young children. In DSM-III, it was noted that the average age for onset of ADHD symptoms “is typically by the age of three, although frequently the disorder does not come to professional attention until the child enters school” (American Psychiatric Association 1980, p. 42). Subsequent editions of DSM stated that at least some ADHD symptoms had to have been noticed by age 7 years in order for the disorder to be legitimately diagnosed. Incredibly, some clinicians still refuse to diagnose ADHD, regardless of how obvious current symptoms might be, unless a history of early childhood problems with ADHD symptoms can be documented by parent testimony or written teacher reports from early childhood.

After research demonstrated that a significant number of children diagnosed with ADHD at age 12, without having shown symptoms by

age 7, tended to be fully as impaired as those with earlier onset of ADHD symptoms (Polanczyk et al. 2010), the 2013 version of the diagnostic manual, DSM-5 (American Psychiatric Association 2013), belatedly modified the age at onset criterion by stipulating that at least some inattentive or hyperactive-impulsive symptoms should be present prior to age 12 years to warrant an ADHD diagnosis.

However, this revision of the age at onset for ADHD to age 12 remains inappropriate, given the fact that there are some individuals with significant ADHD impairments who do not manifest significant symptoms until middle to late adolescence. Research by our group at Yale found that many adults with ADHD and high IQ did not demonstrate significant impairments until they encountered the challenges of middle to late adolescence and early adulthood (Brown et al. 2009). They did quite well in school and at home, often being recognized as honor students at school with the reputation for very good behavior at home and in the community. It was not until secondary school and the increased demands for self-management and more independent work in multiple classes with various teachers that the ADHD-related impairments of these patients became noticeable. In some cases, parents provide extensive and consistent scaffolding to assist their children with ADHD, so much so that their sons and daughters do not appear to have any significant ADHD-related impairments until they move away from home to attend university or to seek employment, when the scaffolding is no longer present.

One study (Faraone et al. 2006a) compared two groups of adults carefully diagnosed with ADHD. One group included those who met all DSM criteria for the disorder, including the requirement of at least some noticeable symptoms before age 7. The other group met all diagnostic criteria except for the onset of at least some ADHD symptoms prior to age 7 years. The researchers found that those with later onset did not differ significantly from the early-onset group in patterns of functional impairment, number of blood relatives with ADHD, or levels of comorbid disorders. A subsequent study (Faraone et al. 2006c) of the same groups of adults found that personality profiles of those with onset of ADHD symptoms prior to age 7 years were not significantly different from profiles of those with later onset of ADHD. It is hoped that subsequent versions of DSM will dispense with the specific age at onset requirement, treating this disorder somewhat like anxiety disorders, none of which require any specific age at onset.

Most of the executive functions impaired by ADHD do not fully mature in anyone until late teens or early 20s. The infrastructure of the brain that supports executive functions depends on a process of maturation

that includes two major components: 1) a massive proliferation of cortical cells in the brain that begins in mid-childhood and usually peaks sometime around puberty and 2) a long process of pruning these increasing cell networks over a number of years to develop efficient circuits. This dual process of developing the circuits and regional connections of the brain that support executive functions is not fully completed until the late teen years or early 20s.

Most governments do not allow children younger than 16–18 years to drive a motor vehicle on public streets. This is not because their legs are too short to reach the accelerator and brake. That problem could be easily remedied by altering the design of the vehicle. The reason that the privilege of driving is reserved for those who have reached later adolescence is not that younger children are too short to drive. That prohibition is maintained because the brain maturation processes needed to safely manage the complex tasks and responsibilities of driving a motor vehicle are not sufficiently developed until late adolescence or early adulthood.

Over the past 2 years, controversy has arisen among researchers about whether ADHD can arise in young adulthood in persons who showed no evidence of ADHD symptoms in childhood. This controversy arose from data obtained in several longitudinal research studies of children evaluated in childhood and then followed up into their adult years. Each study had one group carefully diagnosed as having ADHD and a comparison group carefully evaluated and found not to have ADHD in childhood.

One study done in Dunedin, New Zealand, identified a birth cohort of 1,037 children born in 1972–1973; these children were followed until they reached the age of 38 years. About 6% (61) of the children were found to have ADHD in early childhood; the rest did not have ADHD. At age 38, only 3 of those 61 continued to meet ADHD diagnostic criteria. In the total sample, 3% (31) met diagnostic criteria for ADHD at age 38 years; however, 28 of them had not been found to have ADHD in childhood. This led the researchers to question the long-held assumption that ADHD always starts sometime in childhood and does not have an initial onset during adulthood (Moffitt et al. 2015).

A somewhat similar study was done with a birth cohort sample obtained in Pelotas, Brazil, in 1993. At age 11 years, 8.9% (393) of that group were found to have ADHD; the rest did not have ADHD. When the whole group was evaluated again at age 18 years, 12.2% (492 persons) were found to fully meet diagnostic criteria for ADHD. Only 60 of the 492 identified in childhood as having ADHD continued to have it at age 18. And only 60 of those identified as having ADHD at age 18 years had

been found to have ADHD when they were evaluated at age 11 years (Caye et al. 2016). Here again, the researchers argued that the data supported the notion that ADHD does not always begin in childhood, that it could arise for the first time in young adulthood.

A third birth cohort study also yielded findings that challenged the assumption that ADHD always has onset during childhood. This study of 2,040 children was done in England and Wales starting in 1995. Agnew-Blais et al. (2016) found that 247 met diagnostic criteria for ADHD in childhood; of those, only 54 (21.9%) continued to meet ADHD diagnostic criteria when they were 18 years old. Yet there were 112 in the sample who had not met diagnostic criteria for ADHD in childhood but did meet full diagnostic criteria for ADHD when they were adults at age 18 years. Thus, three recent longitudinal studies have independently demonstrated that a significant number of individuals who do not appear to have ADHD in childhood may have experienced initial onset of ADHD-related impairments in their late teens or early adulthood.

One possible explanation for these findings may be found in the discussion in the section “Differences in Age at Onset of ADHD Symptoms”—some impairments of ADHD do not become apparent until the individual meets the increased challenges of late adolescence or adulthood, at times when parental support has been more or less withdrawn. Faraone and Biederman (2016) have argued this view.

Yet another possibility was raised by an earlier Swedish genetic study of 1,480 twin pairs who were studied for attentional problems at ages 8/9, 13/14, 16/17, and 19/20. This study used both parental ratings and self-ratings of attentional problems and found that genetic effects operating at 8/9 years tended to persist, explaining 41%, 34%, and 24% of the variance over the three later age groups, respectively. However, researchers also found that new sets of genetic risk factors emerged at ages 13/14, 16/17, and 19/20 years (Chang et al. 2013). This finding suggests that attention problems are a developmentally complex phenotype that may involve both continuity and emerging genetic change across the life span.

For some individuals, their ADHD impairments do not become very noticeable until they encounter the challenges of adolescence or adulthood. They function quite adequately or even very well in comparison with their age-mates during preschool and elementary school. There may be no reason for parents, teachers, or anyone else to assume that these children have ADHD—until they reach middle school, where they no longer have one teacher for most of the day and they need to move from class to class. Students now must accommodate to the different rules and expectations of various teachers with differing teaching styles and differ-

ent personalities—one who wants everyone to sit quietly and another who solicits speaking out for many informal class discussions, one who is very strict about deadlines for assignments, and another who is very forgiving of late papers and often does not even check to see if homework has been completed. As the academic and social routines of school become more complicated and there are increasing demands for students to keep track of their own materials in moving from class to class, to write down multiple assignments in their plan book, and to keep track of when assignments are due and tests will be given, many students who were able to function well in the more tightly organized routines and closer supervision of earlier grades begin to show signs of inadequate development of the self-management skills needed for more independent work.

This later onset of ADHD symptoms can be compared to another medical diagnosis. If a person is given an electrocardiogram (ECG) while lying still on a table, the ECG strip may appear perfectly clean. Yet if the same person is given the same test while walking rapidly or jogging on a treadmill with incline resistance, that person may be found to have significant irregularities or occlusion of arteries that were not apparent until his or her cardiovascular system was challenged with increasingly stressful demands. For many persons with ADHD, the demands of the preadolescent years are much like having an ECG done while lying still on a table; their impairments may not become apparent until the increased self-management challenges of adolescence or early adulthood are encountered.

Differences in Persistence or Remission of ADHD Symptoms

For most of the twentieth century, it was assumed that the disorder now known as ADHD occurred only in young children and that it was outgrown in later childhood or early to middle adolescence. These assumptions were based on observations that hyperactive children usually became much less “hyper” sometime during that period. During those decades, ADHD was defined primarily by hyperactivity and misbehavior; attentional problems were not recognized as a primary component of the disorder.

In many countries, ADHD is still thought of as a childhood disorder that is simply outgrown during adolescence. A study by the World Health Organization has challenged that view. Using data from a survey in 10 different countries as diverse as France, Germany, Italy, Lebanon, Mexico, Colombia, and the United States, Lara et al. (2009) found that an

average of 50% of children diagnosed with ADHD continue to fully meet DSM-IV (American Psychiatric Association 1994) diagnostic criteria for ADHD as adults.

Continuing to fully meet DSM-IV diagnostic criteria for ADHD, however, is not a sufficient criterion to determine whether a person is still experiencing significant impairments from ADHD as he or she matures into adulthood. As mentioned in the introduction, those diagnostic criteria were developed and tested only for children ages 4–17 years. There are many ways in which ADHD can impair functioning in adults that are not listed in the DSM criteria. Biederman et al. (2010a) did a 10-year follow-up study of boys diagnosed with ADHD versus control subjects. They used four different categories to describe the persistence of ADHD: 1) continued to fully meet full DSM-IV diagnostic criteria for ADHD; 2) continued to meet half of the DSM-IV criteria; 3) showed impairment on a global assessment of functioning; 4) did not meet criterion 1, 2, or 3 but were currently being medicated for ADHD.

Using those four categories of persistence, Biederman and colleagues (2010a) found that 35% still met full ADHD criteria; 22% continued to have half of the ADHD symptoms; 15% still showed impairment on a global assessment of functioning; and 6% did not meet these three criteria but were still being medicated for ADHD. This yielded a total of 78% of those boys 18 years or older for whom impairments of ADHD persisted beyond childhood. A similar follow-up study of girls diagnosed with ADHD during childhood yielded almost identical results: 77% continued to manifest impairing ADHD symptoms into adulthood (Biederman et al. 2012).

Subsequent research has confirmed that many, if not most, individuals who have ADHD with excessive hyperactivity tend to become significantly less “hyper” as they move through puberty, whereas their inattention symptoms tend to persist and often become more problematic as they encounter the challenges of adolescence and adulthood, which often bring a variety of new impairments.

A study of 500 nonreferred adults whose ADHD persisted reported a wide range of impairments compared with 501 age- and gender-matched community adults without ADHD (Biederman et al. 2006). Those with ADHD were more likely to have left high school without earning a diploma (17% vs. 7%), were less likely to have obtained a college degree (19% vs. 26%), were less likely to be currently employed (52% vs. 72%), were less likely to have a good current relationship with their parents (47% vs. 70%), were less likely to report getting along with coworkers (47% vs. 66%), and were less likely to report stability in love relationships and had higher rates of divorce (28% vs. 15%).

Many factors influence the level of impairment for a given individual with ADHD at various points across the life span. Typically, the most difficult years for those with ADHD are junior high, high school, and the first few years of postsecondary schooling or work. Those are the years when one is usually required to do the widest range of tasks with the least opportunity to escape from tasks in which one is not especially interested or competent. Schooling in those years generally requires that students develop some mastery of skills in language, math, history, science, and humanities, regardless of their level of interest, competence, or vocational plans.

Later years of schooling and employment usually allow an individual to specialize in a narrower range of tasks that, hopefully, will fit better with his or her abilities and vocational interests. At that time, individuals more proficient in processing numerical, mechanical, or scientific data can focus on those interests and avoid having to take courses for which they need to write term papers. At the same time, individuals more inclined to work with words or interpersonal relationships may be able to utilize those skills without having to take courses that require more advanced levels of math or science. Those who are really fortunate may find their way into employment where they can build on their personal interests and competence, leaving to others most of the tasks outside their own range of skills and interest. Persons with ADHD usually tend to do best when they are working at tasks that fit with their active interests.

Another influence on level of impairment is access to rewards. For many individuals with ADHD, motivation to do schoolwork is weak, especially when those tasks are not intrinsically interesting to them. The prospect of getting a good grade on a report card given out many weeks in the future does little to spur their interest in working on classwork or homework today. However, some of those same individuals are strongly motivated to work with enthusiasm and sustained effort when they can see a more immediate reward, such as a paycheck at the end of each week. While in school, some students are satisfied to work hard for praise from their teachers or parents, and others are motivated by continuing competition with other students in their classes. For some students, however, ADHD-related impairments diminish considerably when they get out of school and are able to find more immediate and more salient rewards in the world of work.

A third influence on duration of impairment is the process of brain development. In Chapter 6, "How ADHD Develops, Sometimes Gets Worse, and Sometimes Improves," I provide more detailed information about brain development with ADHD, but in this discussion of persis-

tence and remission, it is important to note that 20%–30% of individuals with ADHD during adolescence no longer meet full diagnostic criteria for ADHD by early adulthood. Recent imaging studies have shown clearly demonstrable differences in the brain functioning of adults whose ADHD symptoms have remitted and those whose ADHD symptoms persist. Those with persisting symptoms showed impaired functional connections between the prefrontal cortex and the cingulate cortex; those whose ADHD symptoms had cleared did not show that impairment and those connections were no different than in other adults who never had ADHD (Mattfeld et al. 2014).

Differences in Gender

Early studies reported that six boys were diagnosed with ADHD for every one girl identified with the disorder. This ratio was based on children brought into clinical settings such as hospitals or child guidance clinics. Epidemiological studies that made inquiries in community samples, not counting only those brought in for treatment, have reported ratios closer to 3:1. However, when adults are assessed, the ratio of males to females with ADHD is closer to 1:1. This suggests that there are many girls with ADHD-related impairments who are not identified until they become adults and are able to come in for evaluation themselves. Perhaps this occurs because during early and middle childhood most girls with ADHD are not as disruptive with teachers and parents as are boys.

Comparisons of samples of boys diagnosed with ADHD with girls diagnosed with ADHD have shown no significant differences between the genders in the symptoms they experience, in their cognitive or psychosocial functioning, or in the pattern of other psychological problems associated with their ADHD (Biederman et al. 2010c, 2012; Hinshaw 2002, 2009; Hinshaw et al. 2012).

Although those studies of children included follow-up into late teenage years, there is little systematic research to describe the impact of ADHD on affected adult women. There is evidence that estrogen has a substantial impact on release of dopamine in the female brain (McEwen 1983; Thompson and Moss 1994). There are also clinical data suggesting that varying levels of estrogen due to variations in different phases of the menstrual cycle or diminution of estrogen due to menopause may cause more variability in levels of impairment among females than is generally seen in males. Some adolescent and adult women report that their ADHD impairments tend to worsen and become less responsive to medication treatment regimens at those points in their menstrual cycle where estrogen levels tend to be lowest. A more recent line of research has also dem-

onstrated that some women without any childhood history of ADHD experience midlife onset of significantly impairing ADHD symptoms concurrent with their perimenopausal reduction of estrogen and that medications often used for treatment of ADHD may help to alleviate those symptoms (Epperson et al. 2011, 2015; Shanmugan et al. 2017).

Differences in Underlying Temperament

Temperament is a term that describes a collection of various personality characteristics that are biologically “built in” in each individual, some of which can be observed in early infancy and many of which often persist in subtle and/or blatant patterns into later years. Developmental psychologist Jerome Kagan described and emphasized how

each child is born with a profile of temperamental biases...that creates initial tendencies to be vocal or quiet, vigilant or relaxed, irritable or smiling, and energetic or lethargic with regard to particular events or situations. Parental behaviors, sibling rivalries, friendships, teacher attitudes, emotional identifications with family, ethnic class, religious or national categories, and even the size of the community during the childhood years combine with a host of chance events to sustain, or more often to alter, the relative strength and exact form of the traits the early biases produced. (Kagan 2010, p. 60)

Contrary to stereotypes, there is no one specific temperament pattern that characterizes all individuals with ADHD. Studies of personality traits in children with ADHD have recognized considerable heterogeneity within which several distinctive profiles have been identified (Karalunas et al. 2014; Martel et al. 2010; Nigg et al. 2004). One group tends to be characterized by low levels of extroversion, more shyness, and only mild hyperactive or impulsive traits, as well as less difficulty with attentional control, compared with other ADHD types. Another group is more outgoing, with higher levels of energy and impulsivity, as well as more high-intensity pleasure seeking and activity. A third group exhibits considerable impulsivity, with more difficulty in attentional control and poor self-control, as well as higher levels of anger and irritable behavior. Another group, less numerous, is characterized by more obsessive or perfectionistic characteristics.

Three of these different types were found to reflect unique basic differences not only in temperament but also in basic aspects of physiological functioning that are identified with persisting patterns of cardiac

activity and respiration, as well as with different patterns of functional brain connectivity between the amygdala and other specific areas of the brain. The types also differed in the likelihood of having onset of an additional psychiatric disorder within 1 year of initial evaluation (Karalunas et al. 2014; Martel et al. 2010; Nigg et al. 2004). These studies indicate that these categories based on basic physiological patterns may offer a more reliable and useful way to characterize different types of ADHD than do the present diagnostic subtypes.

Differences in Cognitive Abilities

Many people believe that individuals who are very bright cannot have ADHD. They assume that strong intelligence will protect one from enduring such problems. That is not true. Several studies (Antshel et al. 2007; Brown et al. 2009, 2011a) have demonstrated that some persons with very high IQ experience significant impairments from ADHD. Clinical experience also shows that those impairments are sometimes so severe that despite very high IQ scores, some individuals are not able to complete college or even high school studies and may not be able to get and maintain a job.

In contrast, some have claimed that all persons with ADHD tend to be exceptionally bright, as though having the disorder provides them with special gifts of intelligence, creativity, or ambition, for example. That claim makes sense only if it is rephrased to state that some persons with ADHD have exceptional talents that they are able to deploy in spite of their ADHD impairments. Many of the patients that I have seen in my years of practice are extremely impressive in their gifts and accomplishments. And some, as a result of their struggles with ADHD, have developed a helpful perspective on themselves and various aspects of life. However, there is much evidence that ADHD, which is defined by significant impairments, does not confer on anyone superior intelligence (Brown 2013). Most of those whose intelligence is very remarkable see their ADHD as a burden that has made life more difficult for them, not as a blessing.

The fact is, ADHD is not positively or negatively correlated with IQ. Some persons with ADHD have very superior IQ, some have average IQ, and some have IQ scores at the low end of the IQ spectrum. In my own clinical practice, I have treated many very successful men and women with ADHD who were business executives, physicians, attorneys, scientists, and Ivy League university professors, people who were extremely bright and were quite successful in many aspects of their

schooling and careers and who, despite their impressive intelligence, struggled with significant ADHD impairments. I have also treated many skilled athletes and tradespeople and teachers and managers and nurses and chefs and firefighters and salespeople and office workers and others whose intellectual abilities ranged from extremely high to considerably lower. ADHD is not found exclusively at any one point in the wide range of IQ.

Some very bright students with untreated ADHD are able to get into college but then drop out or are forced to withdraw because of inability to complete assignments by deadlines, to prepare adequately for tests, and to get themselves regularly to their classes. Some of those very bright students who do poorly in school because of their ADHD might be compared to a car with a powerful, high-horsepower engine that has a defective transmission. The power can be generated, but the vehicle lacks the means to transmit the power from the engine to the wheels, so the car cannot move.

One pattern often seen with very bright students who have severe ADHD is that they do very well in some of their courses, those in which they have strong personal interest, but they are unable to mobilize themselves to do adequate work in courses that they find less interesting or blatantly boring. They may complain that the professor is a poor lecturer who does not explain course content clearly or is difficult to listen to because of a monotonous speaking style. Or these students may complain that the content of the course is not something they will ever need and that the curriculum should not require it. Certainly, it is true that some courses are not very interesting and that some professors may know a lot about their subject matter yet be unable to teach the material in a way that students can find interesting or readily understand. Yet most students manage to cope adequately with such courses and teachers, whereas some with ADHD, even those with very strong IQ scores, find it virtually impossible to deploy their abilities effectively to meet the course requirements.

For these bright but struggling students with ADHD, their problem with their studies is usually not lack of ability to learn the course content. It is more a problem of inadequate executive functions, lack of ability to prioritize their activities, lack of adequate focus on the course work, and inability to get started on their work early enough and to sustain their efforts to complete assignments by required deadlines. Sometimes, those students struggle unsuccessfully to get themselves to class regularly and on time; others too often get lost in distracting activities, perhaps playing video games excessively or hanging out too often with friends when they ought to be reading or doing homework. Others may

spend many hours diligently working on course work that interests them, while simply ignoring reading and written assignments for courses they find less interesting. Still others cannot maintain control of their sleeping and alertness. They may stay up too late, possibly drinking excessively or just spending time with friends without getting themselves into bed early enough to get up in time to attend their scheduled classes. Such problems with lack of focus, excessive distractibility, difficulties in organizing and prioritizing tasks, managing sleep and alertness, and avoiding excessive procrastination, for example, are all aspects of problems with executive functions characteristic of ADHD. They are not a result of insufficient ability to understand or lack of intelligence.

In thinking about these issues, it is also important to recognize that there are many types of intelligence and that IQ tests measure aspects of only a few of them. In 1983, psychologist Howard Gardner published his description of seven basic human intelligences: linguistic intelligence, musical intelligence, logical-mathematical intelligence, spatial intelligence, body-kinesthetic intelligence, and the personal intelligences (intrapersonal intelligence and interpersonal intelligence) (Gardner 1983). He described these various modular “intellectual competencies” as “building blocks, out of which productive lines of thought and action are built” (p. 279).

In the 10th anniversary edition of his original book, Gardner joined his view with that of Jerry Fodor, psychologist and philosopher who argued that effective operation of these intelligence modules depends on a more central processing aspect of the brain, “with diverse areas of the nervous system participating in a wide range of activities and being (at least potentially) in constant communication with one another” (Gardner 1993, p. 282). This notion of the brain’s central processing aspects might be considered a way to think about the executive functions, those aspects of the brain that are found to be impaired in ADHD. It offers a way to recognize the variety of intelligences that can be seen as relatively independent of the brain’s central processing and where deployment of those intelligences may be facilitated or, in some situations, impaired because of difficulties with the central processing system (i.e., executive functions).

Differences in Environmental Challenges and Supports

Although the primary factors in causing an individual to have ADHD seem to be genetic, that is not to say that environment is uninvolved.

Genes provide blueprints for our growth and development, but environment has a powerful influence on how and when potential strengths and weaknesses programmed in our genes do or do not activate in ways that may help one to flourish or to experience continuing struggles. Two types of environmental factors are especially important: the intrauterine/perinatal environment during pregnancy and birth and the external environment of people and living conditions from birth onward.

Children whose mothers abused alcohol during pregnancy have double the risk of having ADHD, and those whose mothers were alcohol-dependent during pregnancy were found to be three times more likely to have ADHD (Banerjee et al. 2007). Some pregnancy-related complications, such as toxemia or eclampsia, poor maternal health, exceptionally long labor, umbilical cord around the neck, or low birth weight ($\leq 2,500$ g), may also increase risk of developing ADHD. One population-based study of adults with ADHD showed that low birth weight, preterm birth, and low Apgar scores increase the risk of ADHD, which persists up to 40 years after birth (Halmøy et al. 2012).

As a child is growing up, some family, school, and community environments provide fairly consistent support, which helps the boy or girl to feel safe and encouraged to learn, to fit in with others, and to cope with the various stresses encountered in growing up. In other families and schools, lack of basic economic resources for food, shelter, clothing, and health care; chronic tensions between family members; or physical or mental health problems of caretakers may provide stress, which makes it far more difficult for the child with ADHD to cope and adequately develop. A classic study by child psychiatrist Michael Rutter (Rutter and Quinton 1977) demonstrated that six factors within a family correlated significantly with various psychiatric problems in children: 1) severe marital discord, 2) low social class, 3) large family size, 4) paternal criminality, 5) mental illness of the mother, and 6) foster placement. He found that no one of these factors alone specifically impaired development, but each one added to the negative effect on the children.

The impact of adversity is often seen in clinical practice, but adversity at home or school is especially problematic for those children who suffer from ADHD. Some children live with parents who are so preoccupied in their own struggles with finances, medical illness, chronic marital conflict, depression, anxiety, addiction, and so forth that they are unable to provide much consistent attention or support to their children, especially when a child has special needs beyond the needs of most other children of the same age. Some mothers and fathers are chronically engaged in intense conflicts with one another over their children, one harshly criticizing and punishing the child while the other

takes the opposing side, blindly defending the child against all criticism; both leave the child stressed and confused, caught in the paralyzing guilt of loyalty conflicts.

In some families with a child who has ADHD, parental conflict polarizes over the issue of whether the child does or does not suffer from impairments of ADHD. One parent may see treatment for ADHD as essential to the child's future growth, whereas the other is steadfastly opposed to such a diagnosis and to any accommodations or treatment for ADHD. It is very difficult when one parent tells the child with ADHD, "It's really important for you to take your ADHD medication every day," while the other parent feels the medicine is likely to be harmful and begs the child to avoid taking it.

In some other families, parents are consistently engaged in supporting their child with ADHD. They encourage and support the child in his or her schoolwork and in peer relationships; they keep in touch with the child's teachers and monitor the child's homework on a daily basis. They are realistic in recognizing areas in which the child needs extra support or remedial tutoring, and they work hard to provide what is needed, while also recognizing and encouraging the child's strengths in whatever academic or social domains they appear. Any child with ADHD who has such support on a reasonably consistent basis is likely to suffer much less frustration, stress, and shame compared with the child with ADHD whose impairments are compounded by chronic stress and lack of consistent support at home.

School experience can be a powerful source of stress or a resource of support for the child with ADHD. Some teachers understand very well that the student with ADHD may be suffering from dramatic inconsistency in academic performance or in classroom behavior not because of willfulness or laziness but because that child, at that point in his or her development, does not have adequate control. Faced with this ongoing disappointment and frustration in their efforts to help that child while also attending to the needs of their other students, some teachers are quite patient, doing all they can to help such students.

Other teachers become chronically angry and confrontational with the student who has ADHD, often shaming or punishing the student while continually complaining to the child and his or her parents about the need for improvement of these shortcomings, which the student may be unable to control effectively. Encountering subtle indications or overt confrontations day after day from the teacher who is frequently disappointed, frustrated, and annoyed with the student's ADHD-related impairments can seriously sabotage that child's self-esteem as well as his or her motivation for sustaining effort in school and hope for eventual success.

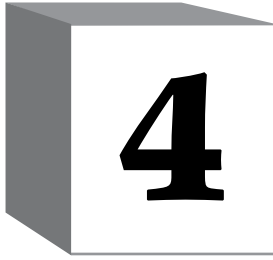
There are many types of environmental stress that can impact any child or adult. Thus far, there have been few studies of how stressors such as unemployment, change of residence, disruption of a close friendship or marital relationship, excessive debt, incarceration, serious illness, or death of a close friend or family member might exacerbate impairments of persons with ADHD. One study of adults with ADHD found that those whose ADHD symptoms are more severe tend to also experience a greater frequency of negative life events than do those with less severe ADHD, regardless of whether they also have a comorbid psychiatric disorder (Garcia et al. 2012). In some cases, the individual's ADHD-related impairments may have contributed substantially to the negative life events (e.g., disruption of relationships, family conflict, loss of employment). In other instances, it may be that individuals experienced serious worsening of their ADHD because they were more severely deprived of adequate family security and support at critical points in their growing up.

Summary

All individuals have difficulty with impairments characteristic of ADHD sometimes, but that does not mean that everyone has ADHD. The diagnosis is appropriately used only for those children, adolescents, or adults who persistently experience much more chronic and significant impairment in their executive functions than do most others of the same age group. Persons with ADHD have these significant impairments in common. Nevertheless, there are many differences among those who are appropriately diagnosed with ADHD.

This variety includes differences in severity of impairment, intensity of hyperactivity and/or impulsiveness, age at onset, persistence or remission of symptoms, gender, underlying temperament, cognitive abilities, and environmental challenges and supports. The main point of this chapter is that those with ADHD are not all alike in their strengths or in their difficulties.

To understand and respond adequately to a person with ADHD, the clinician needs to take into account the unique strengths and vulnerabilities that emerge from that patient's life history and current life situation. In Chapter 4, I discuss how ADHD impacts persons at different ages and stages of development, and in Chapter 7, I describe the ways in which ADHD is often complicated by additional learning and/or psychiatric or medical disorders.



Ways ADHD Can Impair Functioning at Various Age Levels

ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD) is now understood as essentially developmental impairment of the brain's self-management system, its executive functions. The brain structures that support executive functions are not fully developed in early childhood; they are among the slowest developing aspects of the human brain. Early foundations for executive functions begin to emerge quite gradually beginning in the second year of life, but these complex systems for self-management do not fully mature until the late teen years, early 20s, or later.

The model of executive functions introduced in Chapter 2, "A New Model of ADHD," includes six clusters (Brown 2001):

1. **Activation:** Organizing, prioritizing, and activating to work
2. **Focus:** Focusing, sustaining, and shifting attention to tasks
3. **Effort:** Regulating alertness, sustaining effort, and adjusting processing speed
4. **Emotion:** Managing frustration and modulating emotions
5. **Memory:** Utilizing working memory and accessing recall
6. **Action:** Monitoring and self-regulating action

Each of these clusters is a grouping of a variety of cognitive functions that work together to allow a person to take on and deploy knowledge and skills to accomplish a variety of different tasks in daily life. For very young children, those functions are quite basic, but gradually over the years of childhood and adolescence, executive functions develop so the emerging individual learns to manage more complex tasks and to function more independently. As the brain develops, if caretakers provide ample opportunities and encouragement, the typical child gradually learns to do a wider variety of tasks without constantly needing someone else—a parent, older sibling, or other adult—to provide step-by-step directions on what needs to be done, how to accomplish the task, and when to do that specific task.

There is a wide range of “normal” in development of executive functions. We know that some young children learn earlier than others such tasks as how to dress themselves without excessive delay, to tolerate frustration without throwing a tantrum when they do not immediately get what they want, to plan and manage their toilet functions so they do not wet or soil themselves before they get to the bathroom, to take turns with others without pushing or pouting, and to look and move carefully to safely cross a street without an adult to hold their hand. Almost all children eventually master such tasks in early childhood.

Although the range of normal for such development is wide, there is a certain point at which most adults would agree that if a child has not managed particular tasks by a given age, there is something wrong. The child is not meeting usual expectations for development. If the child is intellectually or neurologically disabled, suffering global impairments in multiple domains of functioning, such delays are understandable. But if a child having chronic difficulties in self-management is otherwise adequately developing, then the question may be raised as to whether that child is possibly suffering from the syndrome of impairments known as ADHD.

For decades, it was assumed that any child who has ADHD would show at least some significant signs of impairment in self-management skills by age 7 years. In DSM-5 (American Psychiatric Association 2013), that age was raised to 12 years, the rationale being that any child developing ADHD will show some symptoms of such impairment before entering the teen years. In many, perhaps most, cases, vulnerability to ADHD impairments does begin to show up before adolescence, although it may not always be noticed by parents and teachers at the time. However, that is not always the case. Some individuals fully follow expected patterns of development of executive functions until they are more fully challenged by the greater demands for self-management that do not fully emerge until mid-adolescence, early adulthood, or later.

When considering impairment, it is always necessary to ask the question “Impairment for what tasks and with what stressors or supports?” For example, it is not uncommon for very bright students to earn honor roll grades in elementary school while they are in one classroom most of the day with one teacher who is able to provide considerable structure and consistency. Those same students may begin to have more difficulty when they move into middle school or high school, where they are required to move from one teacher and classroom to another throughout the day, adjusting to the differing structure and demands of each one. In addition, they are now expected to take increasing responsibility for monitoring what assignments are due; allocating sufficient time to complete the work by given deadlines; and balancing the often conflicting demands of multiple assignments, quizzes, or tests with a variety of competing academic, athletic, family, and social interests and commitments.

Some students with ADHD manage these demands in high school reasonably well so long as they are living at home with parents who are providing consistent scaffolding—enforcing requirements for reasonable sleep and eating patterns and protected time for homework and study and ensuring avoidance of alcohol and drug use, abstinence from excessive screen time, adequate preparation for tests, and attention to deadlines for major assignments. However, those same students, however bright, may struggle and fail to perform adequately when they move away from home to attend college without the protective scaffolding their parents were providing. Under the stress of increasing demands for self-management with reduced support, many students with ADHD struggle considerably, and some are unable to continue.

Although there may be considerable variability in what is expected from a child of a particular age from one family or community to another, some expectations are generally consistent for broadly defined age groups. The following sections offer examples of some of the challenges that individuals are usually expected to meet at various age levels, challenges that involve significant use of executive functions. Following each item is a brief description of how persons with ADHD often are impaired in meeting such challenges consistently because of their ADHD-related impairments of executive functions.

The purpose of these examples is to illustrate how the six clusters of executive functions impaired in ADHD take on different forms depending on the age of the affected person and the developmental challenges associated with that particular age group. Impairment is associated with the specific challenges of daily life faced by a given person at a specific time of life.

Impairment is present when the person is not able to adequately perform adaptive life skills usually expected of most individuals in that individual's particular age group and setting. Each of these adaptive skills requires exercise of one or more executive functions, and each is mastered only gradually. Individuals do not master each of these skills fully during the specified age period, but most are able to develop some level of mastery during that age period. With each adaptive skill, there is a brief description of how ADHD-related executive function impairments may impact that function.

Some Adaptive Skills Usually Expected of Preschool Children

- **Behave carefully, avoiding significant risks.** Often, preschool children with ADHD do not behave as carefully as most other children of similar age. Long after most of their peers have learned to be careful around hot stoves and sharp knives and not to run into the street to chase a ball and not to jump from high places, for example, those with ADHD are likely to take such risks because their impairments in working memory prevent them from recalling relevant parental warnings about such things in time to prevent impulsive actions that may result in getting hurt (Dalsgaard et al. 2015a; Schwebel et al. 2002).
- **Get dressed without excessive assistance.** Often preschool children with ADHD continue to need step-by-step adult supervision to do basic daily tasks such as getting themselves dressed in the morning. Such tasks tend to take much longer than for most of their age-mates because children with ADHD tend to get sidetracked much more frequently, easily becoming involved in just dawdling or playing with toys while completely forgetting what they started out to do. They have trouble keeping immediate goals in mind; they are easily distracted.
- **Cooperate in shared play with others.** When preschool children with ADHD participate in free play or organized activities with other children, they often ignore what others are doing and focus only on what they want to do. They may be reluctant to share toys or to take turns, tending to be more impatient with waiting than most others. Once involved in an activity, they may stubbornly refuse to stop an activity so they can transition to something else that needs to be done. They have trouble shifting focus.
- **Modulate extreme emotional reactions.** More than most of their peers, preschoolers with ADHD tend to have extreme emotional re-

actions when they are disappointed, frustrated, angry, or frightened. If they are required to wait for something they want, if they lose in a game, or if they are told “No” to something they want to do, they tend to lose perspective and get flooded with emotion. Even for minor frustrations, they are likely to scream or lash out in anger or to persist in demanding what they want louder or much longer than many others of the same age (Sobanski et al. 2010).

As each child grows older, adaptive skills such as those listed above are expected to become stronger and to be more consistently demonstrated in a wider range of activities and settings without constant need for adult step-by-step reminders or intervention. Being careful may expand to riding a bike carefully in the street; doing tasks without need for excessive supervision may apply to homework or household chores. As the child reaches elementary school, expectations gradually develop for additional adaptive skills.

Some Additional Adaptive Skills Usually Expected of Elementary School Children

- **Demonstrate motivation to learn and use age-appropriate academic skills.** Motivation to learn involves keeping in mind potential rewards to be gained by learning and using academic skills. These potential rewards may be praise from parents and teachers, mastering skills that older kids already have, or getting good grades on a report card. Often, children with ADHD have difficulty keeping such longer-term goals in mind; they tend to be too focused on immediate interests and satisfactions, especially if the environment does not provide the necessary encouragement on an ongoing basis (Luman et al. 2005).
- **Sustain focus and effort on assigned tasks, even when the task is not especially interesting.** Although children with ADHD can be very focused and work very hard on tasks that especially appeal to them, they tend to lose interest quickly and become bored with assigned tasks that they do not find interesting. They tend to become distracted easily and to redirect their attention to other stimuli as they search for more enjoyable pursuits. Sometimes they lose focus because they have not attended carefully to directions given or are not able to monitor themselves when off task (Brown 2005a).

- **Organize and keep track of belongings and materials needed for school and activities.** Parents and teachers often complain that children with ADHD tend to lose track of their belongings and needed materials; they may complete a homework assignment and then lose it in their backpack or forget to hand it in to the teacher. They frequently forget to bring home or return permission slips needed for school activities. This reflects ADHD-related problems with working memory, difficulties with keeping more than one thing in mind at a time. Unless reminded by someone, the child with ADHD packing his backpack at the end of the school day is likely to forget what will be needed that night for homework while preparing to get on the school bus or to walk home.
- **Develop and maintain friendships and activities with some others of comparable age.** Developing and maintaining friendships requires some sensitivity to the needs and feelings of the friend as well as finding ways to meet one's own needs in interaction. Many children develop these skills while engaged in unstructured play or in organized activities where they play a sport with a team, take group lessons in dance, or participate in scouts or other clubs. Although some children with ADHD do quite well in such interactions, many struggle with excessive inattention for the shared tasks or in overreacting to criticism or teasing. Longitudinal studies have shown that as a group, children with ADHD have markedly elevated rates of rejection by their peers (Hoza et al. 2005; Pelham and Bender 1982).

As the child moves gradually into adolescence, he or she is expected to continue to expand and refine development of adaptive skills such as those listed above for younger students. Many teenagers are still working on learning to modulate their excessive emotional reactions to frustrations. Many struggle to demonstrate motivation for learning academic skills and to sustain adequate focus and effort for assigned tasks that do not interest them. For most adolescents with ADHD, these struggles are more intense, persistent, and pervasive than for most of their age-mates.

Adolescents are reacting to emerging or awaited bodily changes of puberty and also tend to feel pressures to become increasingly independent of their parents. They also encounter increasing demands on their time and energy from school, extracurricular activities, social media, friends, and family. In the midst of all this, adolescents encounter escalating expectations to develop even more adaptive skills, as outlined in the following section.

Some Additional Adaptive Skills Usually Expected of Adolescents

- **Sustain motivation to refine academic skills for adequate oral expression, reading comprehension, math concepts and calculations, written expression, and basic cultural knowledge.** To prepare for adequate functioning as adults, adolescents are expected to develop at least high school levels of skills for oral communication, reading comprehension, math, and expressing themselves in writing, as well as basic cultural knowledge of history, government, and other subjects. Although many students with ADHD successfully pursue college and graduate-level degrees, a sizable percentage have difficulties due to their ADHD-related impairments with executive functions, which may cause them to drop out of high school without earning a diploma or discourage them from pursuing postsecondary schooling (Pingault et al. 2011). They may become caught up in persistent hopelessness and apathy about themselves and their potential success in life (Torrente et al. 2011).
- **Keep track of assignments for multiple classes and prioritize tasks and activities, allocating and using sufficient time to study and to complete homework assignments on time.** Many adolescents with ADHD struggle daily to prioritize tasks and manage their multiple commitments. Often, they unrealistically trust themselves to keep all the important tasks in mind, forgetting that working memory impairment is a primary aspect of ADHD. Many also are unrealistic in estimating time needed for tasks and tend to wait until the last minute to start assignments, often leaving themselves insufficient time to do a good job.
- **Maintain a routine for adequate sleep, nutrition, and exercise.** Adolescents as a group tend to have difficulty maintaining adequate sleep and nutrition. Those with ADHD often have much more difficulty in quieting their minds to get to sleep at a reasonable time, and they struggle daily with awakening on time, regardless of how much sleep they have had (Cortese et al. 2009). Some enjoy exercise; others avoid it. Many with ADHD do not maintain adequate nutrition, especially if medications they take for ADHD persist in diminishing their appetite. If they move out of their parental home to attend college or get a job, they often have considerable difficulty in maintaining a stable daily regimen that promotes adequate sleep, nutrition, and exercise.

- **Avoid excessively risky or dangerous behaviors, including use of illicit drugs or alcohol and reckless driving.** Prevalence of substance use disorders among adolescents with ADHD is almost double the rate among those without ADHD (Lee et al. 2011); this age group also has elevated rates of motor vehicle accidents (Barkley et al. 1996, 2002; Thompson et al. 2007). It is extremely difficult for parents to monitor and control these behaviors in their adolescent sons and daughters, and peer pressures may be strong.
- **Learn to understand, enjoy, and manage sexual interests while avoiding excessive risks.** Sexual interests and relationships are very important for most adolescents; these rarely are discussed by adolescents with their parents or other adults. Adolescents with ADHD often struggle with complications of finding and working out relationships with potential partners and also have difficulty managing their own emotional reactions to the ups and downs of dating relationships. Many also are impulsive in sexual relationships, especially when they are drinking or taking drugs, and tend to take excessive risks with exploitative relationships, sexually transmitted disease, or unwanted pregnancy (Barkley et al. 2008).
- **Learn to drive a motor vehicle, qualify for a license, and drive safely.** Many adolescents look forward to getting a driver's license so they can have increased freedom to get themselves around independently without their parents; they also view it as a status symbol. Some adolescents with ADHD are very careful and competent drivers. However, as a group, teens with ADHD tend to have more motor vehicle violations and more motor vehicle accidents than do others of the same age. Their ADHD-related difficulties with impulsive responding, excessive distractibility, and inadequate modulation of frustration can put them at increased risk when in the driver's seat (Thompson et al. 2007; Vaa 2014).
- **Develop and implement a realistic plan for life after high school.** The transition from high school to postsecondary education is for many teenagers the most challenging transition they have yet encountered. As high school concludes, many, although not all, teenagers struggle to select and gain admission to a school to pursue more education, which may involve moving away from home to live independently, without daily contact with their parents and separation from most of the friends who have been their community for many years. For most, this is a welcome transition that works out well. However, for many with ADHD, persisting difficulties with self-management for productive work, allocating priorities for studies and socializing, avoiding excessive alcohol and drug use, and regu-

lating daily routines undermine their success and may disrupt their schooling and limit their career.

For some individuals who experience ADHD during childhood and early adolescence, their ADHD-related impairments of executive function gradually diminish as they reach their late teens and early 20s. Reasons for this are described in Chapter 3, “Differences Among Persons With ADHD.” Those fortunate persons who experience considerable remission of their ADHD impairments may deal with the additional expectations of young adulthood as effectively as most of their peers (Sayal et al. 2015). For those whose ADHD impairments persist, either for lack of diagnosis and adequate treatment or because attempted treatments have been ineffective, the increased expectations encountered during early adulthood may be extremely challenging, placing them in situations where they are not able to keep up with the levels of accomplishment attained by most of their peers. For those affected, this may lead to much disappointment and frustration, particularly if they become alienated from their more successful peers and remain more obviously dependent on their parents for a variety of financial and practical supports than do most of their age-mates. Yet even for those whose ADHD-related impairments become less severe as they get older, the following expectations of young adulthood can be quite challenging.

Some Additional Adaptive Skills Usually Expected of Young Adults

- **Complete appropriate education and training to prepare adequately for a career.** Young adults are usually expected to obtain education and/or training that will prepare them to earn an adequate living. For those who pursue skilled professions, this may require many years of college and graduate-level education followed by supervised postgraduate training. Others enter fields for which training is more technical, requiring apprenticeship; still others proceed directly from high school to learn their work skills on the job. Among those whose ADHD-related impairments persist into early adulthood, especially if they remain untreated, the demands of postsecondary education may become overwhelming, causing them to take longer than most peers to complete their degree or training program. In some instances, they are unsuccessful and abandon their original plans, seeking whatever other employment they find available. Most

studies indicate that, as a group, those with persisting ADHD have lower levels of academic achievement, complete fewer years of post-secondary education, and have a lower percentage of completing a college degree than matched control subjects without ADHD (Biederman et al. 2006; Frazier et al. 2007; Kuriyan et al. 2013; Stavro et al. 2007).

- **Find and maintain employment to earn adequate income.** Transitioning from high school or postsecondary schooling to employment is difficult for almost everyone, but those young adults who have persisting ADHD-related impairments tend to have considerable difficulty in finding and keeping a job. As job seekers, many with ADHD struggle intensely with inevitable frustrations in researching potential job openings, filing numerous applications while receiving few encouraging responses, and performing well in stressful interviews. Once hired, rookie employees with ADHD often find it especially difficult to learn quickly and remember new required skill sets, to accommodate to supervisors who may not be supportive, to meet expectations for consistent promptness and minimal absences, and to fit themselves into the social system at work as they begin employment at a place where the rules may be very different from what they were in school. Some with ADHD negotiate these transitions quite successfully, but others suffer with long periods of unemployment or find it necessary to accept a job with much smaller rewards and fewer opportunities for advancement than they hoped for or expected. One of the few controlled studies of employment problems compared adults with ADHD with matched control subjects in the same community. Results indicated that those with ADHD reported significantly more difficulties in their work history than did those in a community sample. These difficulties included having more frequent conflicts with others on the job, having more often quit their job out of boredom, having been disciplined by their supervisor more frequently, and having been fired more often (Barkley et al. 2008).
- **Manage money, pay bills, and avoid excessive debt.** Young adults are expected to develop not only the ability to earn money but also the ability to manage the money they earn. This is quite challenging for many adults with ADHD, given their tendency to focus excessively on the present moment, often acting impulsively and giving less attention to future consequences. One study that compared adults with ADHD with community control subjects found that those with ADHD reported significantly more difficulty in saving money and more buying on impulse. They had missed their rent payment more often, had experienced their utilities being turned off because of

nonpayment, had had a vehicle repossessed, had declared bankruptcy, or had not saved for retirement (Barkley et al. 2008).

- **Develop and sustain relationships with friends and possibly a partner.** In recent decades in the United States, we have seen significant changes in patterns of dating and marriage. Fewer young adults are marrying in their early 20s; the majority of first marriages now occur in mid to late 20s or beyond, while an increasing number of adults remain single (Centers for Disease Control and Prevention 2015). At the same time, there is a reported increase in the number of couples who live together during young adulthood, sometimes as a prelude to a committed relationship and sometimes simply as a convenient temporary arrangement (Copen et al. 2013). Among young adults with persisting ADHD compared with community control subjects, limited studies indicate no significant differences in the percentages of young adults currently dating someone, in the length of their dating relationships, or in the number of persons dated over the previous 5 years (Barkley et al. 2008). However, in one such study, there was a significant difference between these two groups in their reported level of satisfaction with their dating relationships. Reports indicating fair to poor quality in dating relationships were four to five times more frequent among young adults with ADHD than in community control subjects (Barkley et al. 2008). There are insufficient empirical data, at present, to explain this difference. However, clinical data suggest that many young adults with ADHD struggle with chronic difficulties in negotiating mutually satisfactory resolutions to the misunderstandings and conflicts that typically arise in the early stages of more intimate relationships.

It is not easy to draw a clear boundary between young adulthood and what might be called simply adulthood. Some individuals in their mid to late 20s have completed their education, are employed full-time, have their own home, fully support themselves financially, have a stable relationship with a partner, and may be parenting one or more children. Others of the same age are still years away from such a situation, either because they are engaged in protracted professional education and training that does not yet provide much financial support or because they have not been successful in finding adequate employment to enable them to support themselves consistently, possibly because of bad luck or the impairments of executive function associated with ADHD. However, at some point, some additional adaptive skills such as the following are usually expected from most adults, although there are many who are not able or choose not to achieve or sustain these tasks.

Some Additional Adaptive Skills Usually Expected of Adults

- **Sustain employment to provide ongoing support for oneself and any dependents.** Adults generally are expected to sustain employment that will allow them to pay living expenses for themselves and any dependents, without relying on parents or others to provide support unless there are unusual circumstances of disability or misfortune. Unless the individual has inherited extraordinary financial resources, this requires steady employment, which depends on many factors, only some of which are under the control of the individual worker. One study (Barkley and Murphy 2010) compared employer ratings of work performance of adults with persisting ADHD with adult workers in a group of community control subjects who did not have ADHD. Without being informed about which workers had ADHD, employers rated workers with ADHD as more impaired in their work performance, pursuing fewer educational opportunities at work, being less punctual, showing poorer time management, and doing less well in managing daily responsibilities than workers in the community control group. Interestingly, these employer ratings were quite consistent with self-ratings by workers in each group who were asked to describe their own work performance. They also were consistent with the findings that those adults with ADHD reported having had more different jobs since high school and shorter lengths of stay on previous jobs than reported by community control subjects. It is important to keep in mind, however, that these are group data. Among those with ADHD, there are many who perform extremely well at their jobs, but that is not the overall trend for the group.
- **Develop and sustain mutually satisfying relationships with friends and/or a partner.** Most, although not all, adults tend to seek mutually satisfying relationships with some friends; many also are motivated to develop a more intimate and lasting relationship with a chosen partner. For some, there are many different friends, perhaps a small group that spends considerable time socializing together once or twice almost every week. For others, friendships are more individualized, usually maintained on a one-to-one basis. Still others narrow their social contacts to focus on one very close friend who may or may not become a longer-term partner, a friend with benefits, or perhaps a marriage partner. Among those with ADHD, some have very stable and satisfying social relationships, but for others these rela-

tionships are frequently and painfully disrupted or ended; for some, there is a succession of new acquaintances, friends, or dating partners. For those individuals with persisting ADHD who do marry, reports of marital satisfaction from both the partner with ADHD and the mate without ADHD tend, in group data, to be much lower than such reports from matched samples of control subjects without ADHD. Such relationships may be destabilized by ADHD-related problems of excessive forgetfulness, chronic inattention to the needs of the partner, and/or lack of dependability in keeping a commitment (Eakin et al. 2004). Emotional dynamics of such relationships are discussed more fully in Chapter 9, "Emotional Dynamics in Individuals, Couples, and Families Coping With ADHD."

- **Establish an adequate home for oneself and any partner or dependents.** Establishing a home does not necessarily mean buying a house or condominium; nor does it necessarily refer to a place where one will live for a long time. Most adults seek for themselves and are expected to develop for themselves living quarters that they regard as their home, not simply a place to live temporarily while they continue to consider the home of their parents to be their only real home. Regardless of whether the space for this home is rented, bought with a mortgage, or purchased outright, as they settle into their own home, adults usually begin to make or acquire some furnishings and decorations that help to personalize their home and to spend time and effort in cleaning and improving it, even if their stay in that place may be rather short. In a study comparing adults with persisting ADHD with community control subjects, those with ADHD reported significantly more difficulties in managing home-related finances, such as missing rent payments, missing loan payments, and missing utility payments (Barkley et al. 2008). These difficulties are likely due to ADHD-related impairments of executive function such as planning, prioritizing, and monitoring one's actions.
- **Parent one or more children, when desired and ready and with adequate resources, providing emotional, financial, and practical support for their education and development.** Not all adults want to become parents, but many look forward to having a child or children and caring for them as a very important part of their life. What is expected of adults who choose to become parents is that they will be responsible for providing adequate protection, love, and care as well as sufficient financial and practical support for any children they give birth to or adopt until the children are old enough and able to take care of themselves. Many parents who have ADHD provide consistently excellent care for their children, but some episodically or

chronically struggle to provide adequate parenting support for their children. They may be too inconsistent in providing structures for encouraging appropriate behaviors and discouraging inappropriate behaviors. One complicating factor, in addition to the ADHD-related impairments of the parents, may be that because of the high heritability of ADHD, many parents with ADHD have offspring who also have ADHD. These children are likely to be more challenging to raise and care for. In parenting couples where one or both have ADHD, estimates are that 43%–56% of the children have ADHD. Providing adequate parental care to assist children who have ADHD with the daily tasks of managing behavior, meeting expectations in school, coping with peer interactions, sustaining good health care, and meeting other demands of family life can be very challenging for any parents; it is likely to be considerably more difficult for parents who themselves continue to grapple with ADHD. For example, many children with ADHD need their parents to be much more involved in collaborating with teachers and other school staff to monitor assignments and achievement levels. These children may also need their parents to advocate for them with school officials to make certain that they get adequate educational support and any needed accommodations or special education services. Children with ADHD also are likely to have special needs for diagnosis and supportive treatment, which probably involves regular consultations with physicians, psychologists, or other mental health professionals. Many also need to take prescribed medications for their ADHD and need parents to monitor their medications, refill the medications as needed, and keep health care providers aware of any emerging difficulties for which adjustments or changes in treatment and support may be needed. These added responsibilities can be quite difficult for any parents; they can be overwhelming for some parents with continuing ADHD despite their wish to do well.

- **Manage health care and insurance for oneself and any dependents.** Whether an adult has children to care for or not, another important adaptive skill is taking care of one's own health with good dietary practices, regular preventive health care, and adequate dental care. This involves not only attending to health problems conscientiously when they arise but also keeping track of when one ought to make an appointment to see a health care provider for a checkup, keeping needed prescriptions refilled, taking medications as needed, and so forth. To support these health care services and treatments, for oneself and one's family, routines need to be established and maintained, insurance coverage needs to be arranged and maintained, forms need to be completed, and pay-

ments need to be made. For those with persisting ADHD, caring for their own health also involves obtaining and sustaining appropriate medical and, if needed, mental health treatment for their ADHD impairments and related disorders. Population studies have shown that those with persisting ADHD have increased risk of premature death, usually due to accidents (Dalsgaard et al. 2015b). One population study found significantly elevated risk of suicide or attempted suicide among persons with ADHD (Ljung et al. 2014).

- **Contribute emotional support and necessary care to aging parents and extended family.** In addition to coping with the adaptive responsibilities described above, as adults get older, other concerns and challenges often arise from aging parents and possibly other extended family members—grandparents, siblings, aunts, uncles, cousins, or others—who may need help with managing emerging health problems or other life stresses. Loyalties to these family members, particularly as they enter their later years, often cause adults to struggle with multiple demands and desires to provide emotional, practical, and/or financial support, small or large, short term or longer term. This involves time for staying in touch and helping out in addition to the ongoing responsibilities or pressures from their immediate family, work, and other interests.

These responsibilities to parents and extended family are sometimes quite limited and may be shared by numerous other family members. Sometimes, however, such responsibilities may be extremely burdensome and long-lasting in ways that would be overwhelming for any adult. For adults with persisting ADHD, managing such multiple tasks and expectations may be extremely difficult, especially when they arise as the adult himself or herself is dealing with the various demands of daily life and also approaching a time when more detailed planning for his or her own aging and retirement may also need increasing consideration.

At present, there are few systematic studies of how adults with ADHD fare in midlife and beyond. One population-based study of adults in Australia ages 47–54 years (Das et al. 2012) found that those with ADHD were more likely to be unemployed in midlife, more likely to be suffering from financial problems, more likely to be separated or divorced, and more likely to report depressive symptoms than those without ADHD. There was no significant difference between men and women on these midlife measures.

Looking at a sample of adults with ADHD at an average age of 68 years, researchers in the Netherlands found that those with ADHD tended to

have lower income, had three times greater odds of being divorced or never married, had a more limited network of social contacts, and reported higher levels of emotional loneliness than a comparison group of adults of comparable age without ADHD (Michielsens et al. 2015a, 2015b). It should be noted, however, that these are group data, and not all participants with ADHD experienced the reported impairments.

Summary

Executive functions depend upon an infrastructure composed of the slowest developing structures of the human brain. Neuroscience data demonstrate that although primordial foundations of those functions begin to emerge in preschool years, the brain's management system does not approach maturity until an individual's late teen years, early twenties, or even later. In this chapter, I describe specific skills and adaptive behaviors usually expected from individuals at various stages of development from preschool years to adulthood and the ways in which individuals with ADHD often struggle with those challenges over the course of development.

The chapter does not include all the additional challenges often faced by many in the general population as well as individuals with ADHD. Examples include job losses, disruptive relationships in marriages and parenting, persisting poverty, severe and chronic physical or mental illness in key family members, untimely deaths of friends or family members, and any of the wide variety of misfortunes and bad luck that may occur throughout life. What often is amazing is the way that many children, adolescents, and adults—with and without ADHD—often cope extremely well with such misfortunes. However, among those with ADHD, such additional stressors can become overwhelming.



How ADHD Impacts “Brain Googling” for Motivations

IN CHAPTER 1, I DESCRIBE THE CENTRAL MYSTERY
of attention-deficit/hyperactivity disorder (ADHD):

Although they have considerable chronic difficulty in getting organized and getting started on many tasks, focusing their attention, sustaining their efforts, and utilizing their short-term working memory, all of those diagnosed with ADHD tend to have at least a few specific activities or tasks for which they have no difficulty in exercising these very same functions in a normal or even extraordinary way.

This puzzling inconsistency, this ability to exercise executive functions very well in certain specific situations or for some specific tasks but not others, makes it appear that ADHD is a problem with willpower. Many people who see these differences in persons with ADHD from one situation to another, and many with ADHD themselves, assume that if someone is capable of mobilizing his abilities for one task or situation, he ought to be able to do it in other situations as well if he really wants to.

This willpower assumption is based on two fundamental misunderstandings of how the human brain works. This assumption ignores the complex and powerful role of unconscious emotions in the brain's pro-

cesses of motivation, and it does not recognize the critical importance of working memory for prioritizing tasks moment by moment. There are several similarities between a Google search for information on a given topic and the process of the human brain in shaping motivations. Although there are important parallels, important differences also exist.

Similarities and Differences Between Google and the Human Brain

Both Google searches and the human brain perform the following:

- Process massive amounts of continually updated visual and verbal information
- Form linkages between bits of information, both visual images and verbal content
- Select and prioritize relevant information to respond to a query within milliseconds

Google has collected and continues to update and index more than 100 million gigabytes of visual images and verbal content. When presented with a query, Google rapidly searches its index to find relevant content and seeks out additional information linked to that content. Google then prioritizes that selected content according to its apparent degree of relevance to the immediate query and the frequency with which each piece of content has been utilized in previous similar searches by others. Google presents the results of all this searching and prioritizing within seconds or milliseconds.

At present, there is no way to quantify how many units of visual and verbal information are stored in the human brain, nor is there any measure to quantify the rate and ways in which this information expands in the brain from infancy across the years of an individual's life span. Nevertheless, most people would agree that any given individual's unique store of images and verbal content rapidly expands to massive proportions over the course of life experiences. The unique differences between one person's information base and another's and the expression of these differences are major factors in what makes us puzzling and interesting to one another.

The primary difference between Google searches and any given individual's motivations, beyond the obvious differences in the size of the information database, is the process by which relevance and prioritizing of information are determined. Google prioritizes based on the relevance of manifest content, which words and synonyms match, and on

the frequency of demand in similar searches by others. In contrast, the primary basis on which humans prioritize information is the emotion associated with conscious and unconscious memories activated by the individual’s thoughts and perceptions at any given moment.

Emotions Prioritize Motivations in the Brain

In 1996, neuroscientist Joseph LeDoux published *The Emotional Brain*, a book highlighting the central importance of emotion in the brain’s cognitive functioning. He emphasized that emotions—mostly unconscious emotions—are powerful and critically important motivators of human thought and actions (LeDoux 1996). This understanding of the essential role of emotion in all aspects of human motivation and behavior has not yet been adequately integrated into current thinking about ADHD (Brown 2014).

Emotions, both positive and negative, play a critical role in executive functions of the brain: initiating and prioritizing tasks, sustaining or shifting interest and effort, holding thoughts in active memory, and choosing to engage in or avoid a task or situation. As was observed by neuroscientist Kenneth Dodge (1991), “All information processing is emotional.... Emotion is the energy level that drives, organizes, amplifies and attenuates cognitive activity” (p. 159).

Whereas Google responds to queries typed into the search engine, the human brain responds to its own constant flow of perceptions and thoughts according to valences and intensity of emotions attached to associated memories. Each person’s brain establishes the relevance and level of priority of whatever is being perceived or thought about on the basis of that individual’s personal history of learning from life experiences consciously and unconsciously remembered in that moment. Recalled experiences are colored by emotions of various types and intensities. The type and intensity of associated emotion, as recalled, provide the basis on which the brain establishes personal priorities to activate interest and engagement or disinterest and possible avoidance in that moment (Pessoa 2013).

The Amygdala as an Important Hub for Developing Priorities

One important hub for the brain’s personal searches is the network of neural connections between the amygdala and various other neural net-

works of the brain. The amygdala consists of a pair of relatively small structures located deep in the brain near the meeting point of a line drawn from between the eyes to the back of head and a line drawn from one ear to the other. For many years, most researchers thought of the human amygdala as serving only to alert the brain to possible dangers. It is now well established that the amygdala also links to visual and auditory cues for multiple emotions, including pleasure and potential rewards. It rapidly screens incoming stimuli, draws on unconscious memories, and alerts the brain to potentially positive and rewarding stimuli as much as to potential dangers (Vullumier 2009). It also plays a particularly important role in social interactions (Buchanan et al. 2009).

The amygdala is one of the most richly connected areas of the brain. It has more than a thousand connections to various other areas throughout the brain (Petrovich et al. 2001). Through these connections, it receives information from all sensory systems of the body (e.g., sight, hearing, touch, smell) as well as from the higher-level management areas of the brain in the cortex. Its rich network of connections also allows the amygdala to send out notifications of interest or warnings of potential danger to other centers throughout the brain.

Each bit of information coming from any part of the brain—each sight, each sound, each image, each thought, each imagining—is screened automatically within milliseconds by the amygdala for possible danger or possible payoff or reward. Much of what is screened is composed of aspects of the person's expected routine, which raise no signal of immediate possible risk or likely payoff. But ambiguous incoming data and cues related to previous experiences of pleasure or fear quickly connect with emotion-laden memories of previous experiences stored in other brain centers; those data can activate immediate interest—positive, negative, or both—which causes the amygdala to instantly alert other relevant areas of the brain.

Unconscious Prioritizing by Emotions

Many people think of emotions as involving only conscious feelings, limited to sensations of sadness, anger, pleasure, worry, and so on, that a person is fully aware of and generally able to identify. Neuroscience has shown that conscious feelings are only a tiny part of the rich and varied range of emotions that operates within each person to motivate executive functions. Neuroscientist Joaquin Fuster (2003) emphasized, "Whereas we may be fully conscious of a retrieved memory—sometimes

painfully so—the vast majority of memories that we retrieve remain unconscious" (p. 138).

Unconscious here is not the old psychoanalytic concept of repression. Rather, it is the more modern sense of unconscious as *automaticity*. This term refers to operations that occur so extremely rapidly within the brain that there is no opportunity for conscious deliberation; they operate automatically on the basis of ultrarapid communications within the networks of the brain using memories from past experiences and perceptual data from the current context of the individual (Bargh 2005).

Often, these unconscious emotions conflict and cause us to act in ways that are quite inconsistent with our recognized conscious intentions. An unrecognized undercurrent of conflicting emotions is often involved in our failure to do tasks that we believe we want to do or in our directly or indirectly engaging in actions that we consciously believe we do not want to do.

Sometimes a person thinks of a particular task as quite important, honestly believing that he wants to give it immediate attention and sustained effort, yet he does not act accordingly. He may continue to procrastinate, busying himself with work on other tasks that are not as urgent or repeatedly interrupting work on the seemingly important task, making little actual progress. Or he may actively seek out distractions by initiating contact with friends, surfing the Internet, getting high, or going to sleep. Such contradictions make sense only when we realize that emotions that guide our motivations often are not fully conscious and are often conflicting. We may be powerfully influenced by emotions that we do not even know we have.

LeDoux (1996) argued:

Many of the things we do, including the appraisal of the emotional significance of events in our lives and the expression of emotional behaviors in response to those appraisals, do not depend on consciousness, or even on processes that we necessarily have conscious access to. (p. 65)

Much of emotional processing goes on outside our awareness, and, as the work of Freud and other psychoanalysts has demonstrated and described, the less conscious emotions are often subtle, contradictory, complex, and powerful. As neuroscientist Antonio Damasio (2003) pointed out, unconscious influences of emotions can powerfully shape and modify our executive functions in ways we cannot recognize:

[T]he emotional signal can operate entirely under the radar of consciousness. It can produce alterations in working memory, attention and reasoning so that *the decision-making process is biased toward selecting the action most*

likely to lead to the best possible outcome, given prior experience. The individual may not even be aware of this covert operation. (p. 148, emphasis added)

I have italicized Damasio's phrase "the decision-making process is biased toward selecting the action most likely to lead to the best possible outcome" and underlined "given prior experience" to caution against misinterpretation. Some people might think that this "best possible outcome" means a weighing of possible pros and cons to make a logical, rational, conscious choice as to what is the best thing to do in a particular situation. To form that interpretation would be to ignore the main point of the quotation. Damasio is writing about the power of *unconscious* choices, a biasing of choices based not on rational thought but on emotions linked to conscious or unconscious memories of previous experiences.

Example of Unconscious Motivations

One example of unconscious motivation is shown by Jim, a first-semester college freshman who was trying to write a take-home midterm exam due at his 8 A.M. class the next morning.

Case Example: A college freshman with biased motives

It was a difficult exam, and Jim was having a lot of trouble answering most of the questions, possibly because he had not yet read even half of the chapters assigned for the test. Jim had put off doing any work on the exam for several days. He had been preoccupied since an e-mail 3 days earlier from his girlfriend back home. She wrote that she wanted to break up because he was now too far away and she had gotten involved with someone else.

About 2 A.M., after struggling with the exam for several hours, Jim decided to take a nap for a couple of hours and then try to finish the exam. He set his alarm for 4 A.M. When the alarm buzzed, Jim woke up for a few moments, turned the alarm off, and went back to sleep. He did not wake up until 5 hours later. When he realized he had slept through the deadline, Jim panicked. The professor had announced that he would not accept any late exams. Recognizing that he would certainly get an F on the midterm, Jim impulsively decided he was not ready to be in college. Without discussing his decision with anyone, he packed his suitcase and left to go home, planning to stay there until the following fall, when he would try again to go to college.

In talking with me back home about this a week later, Jim initially said that dropping out of college was the best thing for him at that point. He said he had been excited to go off to college, but the work seemed too hard for him, he had not yet made any real friends, and he had really been missing his girlfriend and his parents. He also claimed that getting an F

on the midterm would have meant failing that course, so it made no sense for him to continue any of his courses that semester. He could see no other way to deal with that situation. He also mentioned that in coming home he had hoped he could win back his girlfriend's affections. As it turned out, she was not at all interested in getting reinvolved with him.

Jim had quit many activities before. After successfully playing Little League for many years, he had gone out for his high school baseball team and then quit before the first game. He had started two different advanced placement courses and then dropped each of them before the final exam. He was quick to feel unsure of himself and quick to get himself out of any situation where he was afraid he might not do well. Given his prior experiences, quickly escaping from anything stressful felt like the best possible outcome for him. He was biased toward early escape from stress.

Only after several months of psychotherapy was Jim able to see that his “accidental” going back to sleep that morning, his failure to even discuss his situation with his college advisor, and his assumption that he faced inevitable failure were not actually the best choices for him. Those decisions were all examples of his long-standing pattern of quickly jumping to conclusions and fearfully choosing to run away from any stressful situation. Only gradually could he see the various ways he might have been able to work things out so he could have made a success of that first semester, despite his girlfriend's decision to break up and despite his failing that exam. He returned to college the next semester after gradually finding ways to cope more effectively with his fears.

Jim's situation is just one of many possible examples of how people often bias their decisions. They do not realize how much their actions are based on memories of past experiences, in which, for example, they learned to run away too quickly from what they feared. Sometimes, people give up too soon when they feel frustrated or discouraged, or they become demanding and aggressive to try to get what they want from others. Often, memories and associated emotions involved in such situations remain totally unconscious, and the person mistakenly thinks it is obvious that what they choose is the best action. Looking back, it is possible to discern these processes repeatedly operating in the patterns of a lifetime of relationships.

Older Memories and Shaping of Current Interpersonal Relationships

Most of us tend to deal with many people in our present daily life using expectations we bring with us from our earlier experiences with other people we have known. Without realizing it, we assume that people in

our present are very much like one or another person in our past. Sometimes, people in our current lives may be quite similar in one or many ways to others we have known, but at other times, we may assume they are similar when, in fact, they are not.

John Bowlby (1978), pioneer developer of attachment theory, wrote about the persistence of early experience in choices and relationships we make throughout our lifetime. He used the term *representational models* to refer to individuals' persisting personal views of self and others—their aggregated expectations, complex and only partly conscious, of persons to whom they have been attached. These models or memories include our image of who a person is and what that person wants, intends, and will do. They also include our picture of how the person thinks about us, how much that person may be interested in us, how much he or she likes or does not like us, and how much he or she will approve or disapprove of us and our actions and attitudes.

Bowlby suggested that we tend to rely heavily on our representational models of the persons we have been attached to during childhood and adolescence, particularly our parents, siblings, and other family members. These attachment figures tend to be a continuing source of expectations about others whom we meet throughout our lives. He also emphasized that each of us develops representational models of ourselves from our earlier patterns of interactions with family, classmates, and friends we are close to. He claims that we tend to hang on to the pictures of ourselves that we have developed over the years of our growing up, and we often tend to keep on using those old pictures of what kind of person we are and how others will probably think of us and deal with us. We are often unaware of how much we cluelessly bring our past into our present. Here is the way Bowlby (1978) described this process:

Whatever representational models of attachment figures and of self an individual builds during childhood and adolescence tend to persist relatively unchanged into and throughout adult life. As a result one tends to assimilate any new person with whom he forms a bond—a spouse, child, employer or therapist—to an existing model and often to continue to do so despite repeated evidence that the model is inappropriate.

Similarly one expects to be perceived and treated by others in ways that would be appropriate to his self-model and to continue with such expectations despite contrary evidence. Such biased perceptions and expectations lead to various misconceived beliefs about other people, to false expectations about the way they will behave, and to inappropriate actions intended to forestall their expected behavior. (p. 16)

These processes described by LeDoux, Damasio, and Bowlby occur in all of us sometimes. Every one of us has times when we act or fail to

act in ways that may be puzzling to us and to others. In those situations, our motivations may be shaped too much by unrecognized old feelings, old patterns, and old assumptions rather than by our conscious intentions and rational conscious thinking about our current situation.

Emotions and Working Memory in ADHD

For individuals with ADHD, a tendency to act without sufficient thought, contrary to their conscious intentions, seems to be present more frequently than for most others. Their actions are more often made impulsively, without adequately recognizing and fully considering what may be different in the larger context of their immediate situation. Constrained in these ways, persons with ADHD tend often to respond too much to whatever they are noticing and feeling in their immediate situation, in the present moment, while neglecting other facts and other emotions that may be quite relevant and important. They react to many life situations as one might react while watching a basketball game through a telescope that allows one to clearly see a small circle of the action in the game but not the rest of what is going on in the court with other players and various other threats and opportunities that may be present. They have great difficulty in keeping the bigger picture, the larger context, and future possibilities in mind.

One example of the way emotion can affect how a person with ADHD reacts to a situation was provided by a woman who once told me how she dreaded Wednesday evenings. For her family, that was the night after their Wednesday morning trash pickup. She had two teenage sons, and the family lived in a house with a long driveway leading down to the place where their trash was picked up early every Wednesday morning. Her husband asked their boys to take on the job of dragging the trash cans down to the foot of their driveway every Tuesday evening and then to bring the emptied cans back up the driveway after they got home from school on each Wednesday afternoon. Often, they forgot to bring the trash cans back in.

This mother explained that anytime her husband got home from work on Wednesday evening and saw the trash cans still at the base of the driveway, he would become enraged. He would call the boys to come to him and then would get in their faces and scream at them, saying they were losers, irresponsible, ungrateful for what they had been given, unwilling to help the family by doing the simple chore of bringing the trash cans back up to the house once a week. In his rage, he shouted at them:

Neither of you is ever going to amount to anything! If you can't do this simple chore, how will you ever be able to do the bigger things? How will you ever be able to get and hold a job? How will you ever be able to get a wife and take care of her and your children? I've told you about this so damn many times, and you don't listen! You don't remember, and you don't care! I'm disgusted! You're both going to turn out to be a couple of irresponsible losers!

The mother explained that after each time her husband scolded their sons so harshly, he would later calm down and then mumble an apology to the boys. She said, "I know he loves them both and would give his life for either one of them, but when he gets wound up in one of those Wednesday night episodes, he gets so enraged that he seems to forget that those are his sons whom he loves and wants to protect. He really doesn't want to hurt them or have them believe they're destined for failure. All he knows in that moment is that he is furious with both of them for not having done that chore."

Any parent can lose his or her temper with a child occasionally, but most parents, most of the time, can express their frustration to the child without such an intense verbal attack. They can usually keep in mind that this is their child whom they love and want to nurture and protect, despite the frustrations of the moment. Their memory of that larger context allows them to avoid an excessively harsh display of rage, even though they are feeling intense frustration and anger. Their working memory allows them to hold in mind their love even while their anger is taking up a lot of space in their head.

Unfortunately, individuals with ADHD often suffer from significant impairments of working memory that frequently impact not only their ability to remember where they have left their keys, what time they promised to meet someone, what they have just read or heard, and what they were about to say or do. For many, those working memory impairments also impact their ability to remember their love for someone while they are angry at him or her or to keep in mind their hopes for that person when they feel disappointed by him or her. Flooded with one emotion in that moment, they are unable to keep in mind other thoughts and emotions that are important and relevant for guiding their actions.

ADHD researchers have repeatedly demonstrated impairments in working memory as a central feature of this disorder (Alderson et al. 2013; Fried et al. 2016; Kennedy et al. 2016; Martinussen et al. 2005; Quinlan and Brown 2003), but not much has been written to clarify how this memory works or possible causes of working memory impairments commonly seen in ADHD.

Working Memory as a Network Not a Structure in the Brain

Working memory is not a specific structure of tissues that can be identified in imaging studies as can the cerebellum or thalamus. Rather, it is a function of dynamic coordination between multiple neural networks of the brain. These networks are not static. They continually self-modify and rearrange connections with other networks throughout the brain to rapidly route and reroute neural messages, shifting intensity and directions to facilitate exchange of information within and between neural networks of the brain.

This dynamic coordination of brain networks is somewhat similar to, but more complex than, the dynamic electrical circuits that illuminate pixels in frequently shifting patterns to form colors, letters, and images of action on the screen of a television or computer. Problems of working memory are likely to result from impairments in the dynamic functions of interacting networks that form linking interactions among various sectors of the brain (Phillips and Singer 2010).

Recent imaging studies have demonstrated significant difficulties with functional connectivity between various regions of the brain in children and adults with ADHD. For example, studies have demonstrated that those with ADHD tend to have differences in the neural networks that register how potentially rewarding a specific activity might be. Those with ADHD have demonstrated less effective communication in reward pathways of the nucleus accumbens, hypothalamus, caudate, and midbrain in comparison with control subjects (Silvetti et al. 2013; Stark et al. 2011; Tripp and Wickens 2008; Volkow et al. 2009, 2011). These imaging studies have demonstrated less efficient signaling in the brain circuits of persons with ADHD that monitor how appealing or rewarding specific tasks or opportunities might be.

It is difficult for most of us to appreciate the speed and complexity of these processes involved in motivation because we tend to think of them as identical to our conscious process of decision making. We tend to think of motivation in very simple binary terms, as though every action, every shift of focus, were as simple as a conscious decision of “Do you want to do this or don’t you?” The processes of motivation in the brain are much more subtle and complex.

We understand that the visual system of the brain routinely allows us to recognize and construct three-dimensional images of an object even if we can see only a few aspects of the object’s shape or flickering

shadows of its movements. Without conscious deliberation and with amazing speed, our visual cortex transforms rays of light picked up by the cones and rods of our eyes, reflects them on our retinas, associates these reflections with our massive catalog of memories of what we previously have seen, and then constructs for us our vision of complex and often rapidly changing scenes, including multiple objects at various distances in three dimensions with richly textured colors. Shaping of motivation in the brain is at least as complex as shaping of images.

Likewise, we know that our senses allow us to smell and taste many subtle differences between the foods we eat and wines and other beverages we drink, readily associating these with our previous experiences of the smell and taste of countless ingredients encountered at differing temperatures, in multiple combinations in previous situations. The fragrance and taste of these substances can also instantly make multiple connections to times and places where we have had that food or drink before in circumstances we previously found comfortable and enjoyable or nasty and repulsive (Proust 1989).

Sometimes, we consciously recognize and identify the sensations and are fully aware of when and where we have experienced that taste or smell before. In other situations, we may recognize in the moment only the associated pleasure or repulsion, but we may act on that association nevertheless. Most of us have experienced times when we have engaged in actions that literally or figuratively, quickly or much later, have “left a bad taste in our mouth.”

Given that situations of daily life activate many different emotion-laden memories, there is need for the brain to sort and prioritize those memories and associated motives. The brain requires and has ways of scaling importance. Just as our eyes can register varying degrees of intensity from very dim to very bright light and our skin can report varying degrees of hot and cold, so the brain can register highly variable degrees of mild, moderate, and very intense levels of attraction and fear attached to countless memories. These are derived from previous experiences—memories of our own direct experiences and memories derived from things we have seen happening to others or have heard about from others or have imagined happening to us.

Working Memory and Context

All these loadings of emotion-laden memories are context dependent. They vary according to where we are, who we are with, and what we perceive as going on around us. Associative networks of the brain register a much more intense level of fear in response to a sudden noise or

movement when we are alone in a dark and unfamiliar place or in a situation where we know others have been attacked, for example. Likewise, these remarkable networks can arouse intense attraction if the brain detects smells, sounds, or words that hint even slightly at possible pleasure.

Just as the brain's selection of memories attached to various thoughts and perceptions are context dependent, they also are complex and often conflicting. Frequently, emotional associations to a particular thought, sound, smell, or other perception are derived from situations in which that particular sensation or experience has been highly pleasurable and rewarding. However, additional associations with that same thought, sound, smell, or perception may be accompanied by many more associations involving pain, shame, guilt, or fear. One context may pull more associations to darker, more uncomfortable, stressful emotions, whereas in another context, the same stimuli may stimulate strong interest and attraction. Sometimes, such conflicts arise in the same moment, leading us to feel strong conflict. In other situations, reactions may be more serial. We may be struck initially by feelings of attraction and engagement, only later feeling delayed regret, guilt, or fear.

Given this complexity of motivations generated by the brain, how can we understand the variations in the ability of individuals with ADHD to exercise their executive functions from one time to another, even for the same task? Why can a student be unable to begin studying for an examination or start writing a paper until just a few hours before the exam or before the deadline for submitting the paper and then perform extremely well on the exam or writing the paper? The student did not suddenly acquire the needed skills at the eleventh hour; those skills were present throughout the period of procrastination. Reports from those with ADHD indicate that such procrastination may sometimes be due to being too busy with other required activities, but that is most often not the case. Patients often report chronic inability to mobilize and get started on tasks until they feel the situation has become an emergency with consequences that *appear to them* as likely to be very unpleasant or very painful.

The "*appear to them*" in the last sentence is important. Patients with ADHD and their families typically report that excesses of procrastination are rarely without multiple reminders or persistent nagging from parents, teachers, employment supervisors, or friends. The problem is not usually that individuals with ADHD have forgotten the upcoming exam or term paper or the imminent deadline for a work project. Often, they are repeatedly reminding themselves and/or being reminded by others about the task that needs to be done. They may be very much

aware that the task should be done and may even feel that they want to get it started, but they simply do not do it. They may report that they feel urgency for the task they are avoiding, but they persist in avoiding it. Despite their being consciously aware of the urgency, they tend not to feel sufficient urgency until the deadline is imminent.

Some researchers have used the concept of *delay aversion* to describe the tendency of many with ADHD, more than their peers, to have a negative reaction to having to wait, a tendency to want to take a smaller payoff received immediately rather than to wait for a bigger payoff that will be received only after a delay (Sonuga-Barke 2005). A related concept is *delay discounting*, a tendency of some persons to think of a reward or punishment as less appealing (rewards) or less frightening or intimidating (unpleasant consequences), depending on how much farther down the road it is likely to be encountered (Da Matta et al. 2012). In both cases, a potential payoff or punishment is seen by the individual as being not so much to be concerned about in comparison with whatever payoff is likely to be available more immediately, in the here and now.

Two Factors Contributing to Situational Specificity of ADHD Symptoms

We return now to the question raised at the outset of this chapter. Why is it that persons who have ADHD can focus well on some tasks in which they have strong personal interest but are unable to do so for many other tasks they recognize as important? How can these intra-individual differences in motivation characteristic of persons with ADHD be explained? I propose that those situational differences in motivation may be tied to two different aspects of brain functions in persons with ADHD: at the micro level, problems in synaptic transmission, and at the macro level, problems with dynamic coordination in working memory.

Neural Transmission Problems and Situational Specificity of Motivation

The most basic factor contributing to the ability of persons with ADHD to focus very well and efficiently utilize their executive functions on some tasks while being chronically unable to focus adequately on most other tasks is a problem of neural transmission. For many years, it has been recognized that individuals with ADHD tend to chronically have insufficient

release and reloading of the neurotransmitter dopamine at synaptic junctions of neurons in the networks that manage executive functions of the brain (Volkow et al. 2011). Many studies have demonstrated that treatment with stimulant medications improves the efficiency of neural communication at the synaptic gaps. Stimulants can increase the release of dopamine across the synaptic cleft; they also slow the reuptake of dopamine at these synapses, allowing the transmitter to sit slightly longer on postsynaptic receptors to make a better connection. However, this increased dopamine release and slowed reloading is not under voluntary control. It does not occur in response to someone else reminding the person with ADHD that this task is important and should be attended to. It occurs only for those tasks in which the person has strong interest. The heightened interest may be because that activity has brought pleasure or other rewards to the person in the past. Or interest may be intensified because the person fears that something he or she anticipates as being unpleasant is likely to occur very quickly if he or she does not attend to the task immediately. Whether for anticipated pleasure or fear, the heightened interest generates increased release of dopamine instantly and sustains it for as long as the intensified interest persists. However, the individual cannot make this happen just by wishing it to be so.

In other contexts, I have explained this process with an example once suggested to me by a patient with ADHD. He told me the following:

Having ADHD is like having erectile dysfunction of the brain. If the task you are faced with is something that strongly interests you, if it really turns you on, you’re “up” for it and you can perform. But if the task is not something that really interests you, then you can’t get it up and you can’t perform. In that situation, it doesn’t matter how much you may say to yourself, “I need to, I ought to, I should.” You can’t make it happen. It’s just not a willpower kind of thing. (Brown 2005a)

In persons with ADHD who do not have the benefit of stimulant medications, transmission of neural messages tends to be relatively inefficient for routine tasks but not for messages related to actions in which the individual has strong personal interest. For those tasks in which the individual has strong personal interest, the neural transmission is quicker and more potent. The brain gives such messages higher priority. Neural traffic related to actions in which the person has strong personal interest (not because someone tells him or her that he or she ought to be interested in this to get better grades or whatever else but just because he or she is interested, for whatever reason) is usually carried efficiently. However, for those tasks in which the person does not have strong per-

sonal interest and is not especially fearful of a very unpleasant consequence rapidly happening if the task is not immediately attended to, neural transmissions needed to get attention and effort mobilized are likely to be slow and only minimally effective.

Working Memory and Situational Variability of Motivation

The second factor that influences the ability of persons with ADHD to pay attention to some tasks in which they have strong personal interest but not to other tasks in which they lack that strong interest is the relative weakness in working memory that is characteristic of many persons with ADHD. Working memory is essential for keeping in mind relative priorities of our various interests at any given time. Social psychological research has shown that individuals with larger working memory capacity are generally better able to deal with emotions, pleasant and unpleasant, without getting excessively caught up in them (Schmeichel et al. 2008). They may be better able to keep in mind mitigating factors and other relevant information that protect them from becoming too immersed in the emotions of the moment. Those with ADHD tend to have less “bandwidth” in their working memory functions and are likely to have more difficulty than others in quickly linking together various memories relevant to doing or not doing a particular task. They are more likely to respond on the basis of just a small part of their current situation, not adequately taking into account the bigger picture of which the present moment is a part. They are likely to be operating more like someone watching the basketball game through a telescope, unable to take into account the rest of the action on the court, the threats and/or opportunities that are not included in the small circle of focus provided by their telescope.

An example is provided by a man who overslept one day and was late to work. He had been up late working on a lengthy quarterly report required by his employer. As he finished that report shortly before midnight, his wife approached him in an attractive new nightgown, made a romantic overture, and mentioned that she was in the mood for romance. He abruptly told her that he was not interested because he was too tired. She felt disappointed and hurt. This led her to launch into an angry description of other times she had recently felt ignored and neglected by her husband. She questioned whether he still loved her and whether he had lost interest in her and whether he was feeling more attracted to his new secretary. He insisted that he was simply tired from a

long and busy day. A protracted argument ensued; it was almost 3 A.M. before they were able to resolve this situation and get to sleep.

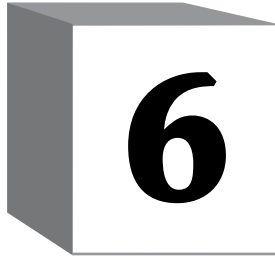
When the husband's alarm clock buzzed at 6 A.M., he awakened for a moment and thought about how he felt exhausted and needed to get more sleep before going to work. He turned the alarm off and went back to sleep, intending to get up after another half hour. He awoke 2 hours later and rushed to shower, dress, and get to his office. He arrived at the office 2 hours late, just as the mandatory weekly staff meeting was concluding. Only then did he remember that on the previous day his boss had warned him that his job would be in jeopardy if he did not stop his frequent habit of arriving late to work. He had not even thought about that very recent warning when he turned off his alarm clock at 6 A.M. to get more sleep. He was too immersed in his strong wish for more sleep and did not remember that he had recently been warned that he might lose his job if he continued his pattern of being chronically late to work. He lost sight of the threat to his job because his working memory failed him. He was unable to retrieve the memory of that important warning he had received the preceding day. He remained too engrossed in the emotion of the moment.

Another way in which context influences motivation is illustrated in the following example. My wife and I were on a transatlantic flight, fortunate enough to ride in business class where mid flight the flight crew baked chocolate chip cookies to serve only to passengers in business seats. The fragrance of the cookies baking wafted through the cabin, and I really wanted one. However, at that time I was on a diet trying to lose a few pounds, and my wife was serving as the food police, reminding me to avoid eating too many sweets. I resolved to decline the cookies and felt proud of myself for abstaining until I noticed that my wife, sitting next to me, was asleep... This put me in considerable conflict between my wish to maintain my diet and my wish to eat one of those delicious cookies. I looked again to be sure she was asleep, and *she was*. At that moment, the flight attendant held out a tray of cookies and asked if I wanted one, so I said, "Yes, please" and also asked if she would give me a second one for my wife, who was asleep. As soon as I got the cookies, I ate *both* of them and then hustled down the galley to dispose of the evidence. I didn't bother my wife with the facts until later in the trip, and we laughed about it. However, I can honestly report that if she had been awake, I would have declined the cookie, feeling somewhat deprived but also proud of myself for sticking to my diet. This is an example of how one can have conflicting motives and be swayed sharply toward one or the other depending on the circumstances of where one is and who else is present.

Summary

This chapter delves further into the “central mystery of ADHD,” which is the puzzling fact that persons with ADHD suffer chronic impairments in their ability to exercise adequate executive functions in many activities of daily life, yet they are able to exercise those same executive functions quite well for a few specific tasks or activities that arouse strong interest or strong fear. This mystery involves situational specificity of unconscious motivations.

In this chapter, I describe the importance and complexity of unconscious emotions in motivation for all people. I then propose that those with ADHD tend to suffer chronic deficits in motivation for many tasks of daily life because they suffer from chronic impairments of working memory. The more limited bandwidth of their working memory restricts their ability to keep in mind the larger context, important aspects of the situation, and the future beyond the present moment. This often leads to inadequate motivation for tasks or activities for which their emotions are not strong enough to stimulate heightened release of dopamine at the involved neuronal junctions.



How ADHD Develops, Sometimes Gets Worse, and Sometimes Improves

LIKE EYE COLOR AND HEIGHT, ATTENTION-DEFICIT/hyperactivity disorder (ADHD) begins with genes. It runs in families. One out of every four people who have ADHD is likely to have a parent with ADHD, whether he or she knows it or not; the other three usually have at least one sibling, grandparent, uncle, aunt, or cousin who has ADHD. These relatives may not have been recognized as having ADHD because in the old days, doctors did not know how to diagnose it. Even today, the diagnosis is often missed because many clinicians have not yet learned about how to recognize ADHD as we now understand it. If you ask family members to think about which blood relatives have had a reputation for being very disorganized or chronically struggling to stay focused or who seemed pretty smart but did not do well in school and then did much better after they got out of school, you may find more than one in the family who possibly had or has ADHD.

The heritability of ADHD is based on genes. Studies that compare identical twins (who share 100% of the same genes) and fraternal twins (who share only 50% of the same genes) provide substantial evidence

that ADHD is inherited. In twin studies, researchers use a scale that ranges from 0 to 1 (heritability index) to show how much genes contribute to a trait or disorder. On that scale, 0 means that genes have no apparent influence on the disorder, and scores closer to 1 suggest that genes play a major role in a person's vulnerability to that disorder. According to the heritability index, breast cancer is about 0.3, asthma is about 0.4, and height is about 0.9. A review of data from 20 different twin studies of ADHD yielded a score of 0.76 on that scale. This very high rate of heritability makes ADHD one of the most heritable of psychiatric disorders (Faraone et al. 2005).

There is no one gene that causes ADHD. Scientists have found that many different genes contribute in small ways that shape developments in the brain, eventually resulting in ADHD. However, the effects of genes on development of ADHD are complicated, and not all are noticeable in early childhood.

Unlike eye color, ADHD is not usually apparent from birth. Often, it is not noticeable until the child is in preschool or in the elementary school years, when he or she is expected to focus on learning, participate in organized group activities, and produce assigned work. In many cases, ADHD is not noticeable until even later. Some very bright children with ADHD are honor students in elementary school with good behavior and high grades; their problems with ADHD-related executive functions may not become apparent until they move into middle school or beyond. Those students may begin to struggle to keep themselves organized and to stay on top of their work only as they get into upper grades, where they have multiple teachers, the work is more challenging, and they need to keep track of many assignments and do more homework independently. Sometimes ADHD symptoms do not appear until the individual encounters the increased challenges of late adolescence or adulthood (Brown et al. 2011a).

How do genes influence an individual to develop the syndrome of difficulties that we call ADHD? Each individual's genes are the blueprint for development of every cell of that person's body, including the brain. However, genes are different from blueprints in that they are dynamic, not static. Some genes, like those for eye color, turn on during fetal development, causing cell growth that remains stable. Other genes do not become at all active until many years after the person is born. Some genes turn on and off depending on other things going on in the body or in the environment. The resulting changes may be very helpful for the healthy functioning of some aspects of the individual; other changes caused by genes turning on or off may impair functioning in limited or in far-reaching ways.

There are three major ways in which research thus far has found brain development and functioning to be different in individuals with ADHD:

- Brain structure and maturation
- Maturation of functional neural connectedness within the brain
- Dynamics of electrochemical communications in the brain

One important influence of genes in ADHD is the timing and rate at which certain parts of the brain structure develop. Several imaging studies have shown that the structure of key cognitive management regions of the brain tends to mature 3–5 years later in most children with ADHD than in their peers (Shaw et al. 2007, 2012, 2013).

Brain Structure and Maturation

For everyone, the process of brain maturation starts during early childhood with a rapid proliferation of cells in the cerebral cortex, the large top part of the brain near the front that is the headquarters for coordinating the brain's management system. This expansive cell growth thickens the cortex. In one study, researchers performed repeated magnetic resonance imaging (MRI) of the brains of 223 children diagnosed with ADHD and 223 typically developing children as they were growing up (Shaw et al. 2007). These images allowed researchers to monitor 40,000 points in the brain of each child to see if there was any noticeable difference in how the brains of those with ADHD matured in comparison with the brains of children who did not have ADHD. Shaw et al. (2007) found no significant differences between the two groups in maturation of brain structures that process such elements as vision, hearing, and movement. However, there were significant differences in the maturation of certain areas of the cortex, headquarters of the management system. On average, persons with ADHD were 3–5 years slower in maturation of some specific areas of the cortex that are important for the brain's cognitive management.

The cortex is the gray matter of the brain. Within it are more than 100 billion infinitesimal neurons intricately connected with each other. Development of countless new connections within the brain results in thickening. For most of the typically developing children in the study by Shaw et al. (2007), that thickening of the cortex peaked by about 7.5 years of age; most children with ADHD did not achieve that peak level of brain thickness until about 3 years later.

A second stage of brain maturation usually begins after the thickening of the cortex. Following that cortical thickening, there is a long pe-

riod, usually during adolescence, of automatic pruning in the cortex to develop more efficient circuits. This is similar to the pruning people do with fruit trees to allow branches to develop better fruit. This second stage also involves an increase in the surface area of the cortex and in further development of gyri (the curvy folds and bumps on its surface). A follow-up imaging study found that children with ADHD were delayed in this second phase of brain development also. They tended to be at least a couple of years delayed in the development of surface area in their cortex when compared with those who did not have ADHD (Shaw et al. 2012).

An important question arising from these research findings on delayed maturation of brain in children and adolescents with ADHD is whether and when their brain development catches up. A sample of 92 young adults who had been diagnosed with ADHD in childhood and had brain imaging assessment prior to age 17 years was evaluated again in young adulthood (average age 24 years) (Shaw et al. 2013). That group was divided into those who still met diagnostic criteria for ADHD (40%) and those whose ADHD symptoms had improved so they no longer met diagnostic criteria (60%). Brain images from both of those ADHD groups were then compared with brain images from 184 typically developing young adults in the same age range.

In participants whose ADHD had remitted, the cortex had thickened just as it had in the typically developing group of the same age. Their brain development caught up. None of those whose ADHD inattention symptoms had continued into that point of young adulthood had any significant thickening of the cortex. Up to that point, their overall cortex remained significantly thinner than that found in the typically developing group and in the group whose ADHD had remitted (Shaw et al. 2013).

The study by Shaw et al. (2013) cannot tell us how many, if any, of those young adults whose ADHD symptoms continued into their mid-20s might experience normal thickening of their cortex in later years. Proal et al. (2011) provide a longer-term view. In their study, researchers followed up on a group of boys, 59 of whom had been diagnosed with ADHD (combined type) in childhood and 80 others who as children were found not to have ADHD. Brain imaging was done on these participants 33 years after they had been diagnosed in childhood. Average age of the group at follow-up was 41 years. Imaging showed that all of those diagnosed with ADHD in childhood had reduced gray matter in several parts of the brain that are critical for control of attention, regulation of emotion, and motivation. Those whose ADHD had remitted by the time of imaging showed more thickening in some specific regions of cortex than did those who still fully met diagnostic criteria for ADHD after 33 years.

More recent MRI research on cortical thickness studied 306 adolescents and young adults with ADHD and compared them with 184 healthy control subjects; average age was 17 years (Schweren et al. 2015). The researchers found that those with ADHD showed significantly thinner cortical tissue than those without ADHD, particularly in the temporal and limbic (middle and lower) cortical regions, areas that play an important role in memory, language, and emotions. That study also checked to see if there were any differences in cortical thickness between persons with ADHD who had been taking stimulant medication and those with ADHD who had not. Results showed no differences in cortical thickness between those who had used medication for their ADHD and those who had never used medication.

Although multiple imaging studies have now demonstrated significant patterns of cortical thinning in samples of children, adolescents, and adults with ADHD versus those without ADHD, much remains to be learned about how those small but persistent differences in brain structure and development are related to the impairments characteristic of ADHD. There are some inconsistencies in these studies, but it does seem clear that there is a pattern of difference in development of cortical tissue for those with ADHD. Interestingly, some studies have found a somewhat similar type of cortical thinning in slightly different cortical regions of adolescents and young adults with autism spectrum disorder (Wallace et al. 2015). A more recent cross-sectional mega-analysis involving over 1,700 individuals with ADHD and more than 1,500 without ADHD used MRI scans from 23 research centers to compare the volume of various brain structures below the cortex as well as full intracranial volume of those in the two groups (Hoogman et al. 2017). Results from this sample, which included individuals ages 4–63 years, showed that those with ADHD tended to have smaller overall intracranial volume and smaller volume of a variety of subcortical structures such as the accumbens, amygdala, and hippocampus. Differences found were not huge, but they were significant. Life span modeling of the data suggested that these differences were related to delay of maturation. Those differences were more marked in children with ADHD than in adults with ADHD. Data also showed that previous use of medication for ADHD and the presence of comorbid disorders did not affect the results. These findings indicate that it is not just the cortical areas of the brain that are delayed in maturation for those with ADHD; development and maturation of the subcortical structures and overall brain volume also tend to be delayed in those with ADHD (Hoogman et al. 2017).

Another aspect of the brain that apparently differs in persons with ADHD is the development of the brain's white matter. White matter is a

complex network of axons, neural “wiring” underneath the gray matter of the cortex, that provides extremely rapid communication from one part of the cortex to another and from the cortex to other regions of the brain that lie beneath the cortex. White matter is sometimes referred to as “the subway of the brain” because of its rapid transit of neural signals below the surface of the cortex. It makes up about half of the brain’s total mass. White matter is studied not with MRI but with a newer technique, diffusion tensor imaging, that measures communication along white matter tracts by testing the integrity of fluid flow within the white matter connections.

One study assessed for white matter differences in brains of adult men diagnosed with or without ADHD during childhood 33 years earlier (Cortese et al. 2013b). Of those men, 51 had been diagnosed with ADHD in childhood, and 66 had been found not to have ADHD. Diffusion tensor imaging (DTI) indicated that the group of men diagnosed with ADHD in childhood showed decreased white matter coherence 33 years later, whether or not they still met diagnostic criteria for ADHD in adulthood. The white matter tracts that showed inefficiencies included a number of tracts that connect to gray matter important for the brain’s management system. Although this is just one study, its comparison of men with a history of ADHD in childhood with control subjects suggests that differences in white matter structure are an enduring trait of persons with ADHD.

Maturation of Functional Connectedness Within the Brain

The cortical imaging and white matter studies discussed in the previous section all reported on structural differences in brain development of persons with ADHD versus those without. Other studies have used functional MRI (fMRI) to study the interactive connectedness of two different regions of the cortex in adults who had been carefully diagnosed with ADHD in childhood (Mattfeld et al. 2014; Sporns 2011, 2012; Sri-pada et al. 2014). These studies assessed not how well those structures of the brain’s management system were built but how effectively they interacted for mutual communication.

Research has demonstrated that the human brain is organized into large functional networks over which patterns of communication from one region of the brain change rapidly depending on what is currently going on within the brain in response to what is happening in the immediate environment. Scientists study these networks with fMRI to see

what patterns emerge as regions activate and communicate with other regions to engage or reconfigure to shift attention and actions (Sporns 2011, 2012).

In one study of adults who had been diagnosed with ADHD during childhood, researchers studied 13 participants who still had full-blown ADHD in adulthood and 22 who no longer had it when evaluated as adults (Mattfeld et al. 2014). The fMRI of those with a history of ADHD in childhood were compared with one another and with brain images of 17 persons who had no history of ADHD. The aim of the study was to assess active connectedness while the brain was awake but not busy with any specific task.

Results showed that active connectedness between two regions that are important for coordinating management activities of the brain (posterior cingulate and medial prefrontal cortices) was very similar for those whose ADHD had remitted and for those who never had ADHD. Active connectedness between the two critical regions of the brain was significantly reduced in persons who had persistent ADHD but not in those who never had ADHD or whose ADHD symptoms had gone away (Mattfeld et al. 2014).

Attentional problems in ADHD often involve problems in the competitive balance between functional networks. One important network focuses primarily on one's own thoughts and wanderings of mind; this is called the *default mode network*. Other networks focus more on processing information outside the individual in order to focus on various external tasks as they arise. From childhood to early adulthood, most individuals show a predictable pattern of maturation, with increasing ability to focus on external tasks. Research has shown that persons with ADHD often have difficulty pulling out of the default mode network to focus consistently on external tasks; they repeatedly tend to "space out" and drift back into default mode even when they are trying to pay attention (Querne et al. 2014; Sidlauskaitė et al. 2016).

One fMRI research project studied 275 children and adolescents diagnosed with ADHD and compared their functional connectivity patterns with those of 288 typically developing participants of similar age (Sripada et al. 2014). The study predicted that children with ADHD would demonstrate a maturational lag in the patterns of connectivity between their default mode network and two other networks that focus more on external tasks. Results clearly demonstrated that compared with persons without ADHD, those with ADHD had a significant age-related delay in maturation of their ability to make and maintain activation of their task-focused networks. Their diminished control of these connections caused excessive drifting off during demanding tasks, ex-

cessive distractibility, and considerable inconsistency in their ability to do tasks. These differences were determined not by their overt behavior but by fMRI study of the patterns of activation in specific brain regions. Moreover, those participants who were rated in advance of the study as having more severe problems with inattention demonstrated greater maturational lag in patterns of functional connection between their default mode network and their other two task-focused networks (Sripada et al. 2014). This study provides much valuable information, but it does not provide any data on whether or not and how much this maturational lag in functional connectivity improves over time for persons with ADHD. That question awaits further research.

Dynamics of Electrochemical Communications in the Brain

The third area where research has demonstrated differences in brains of those with ADHD is the process of communication between groups of neurons that compose the networks of the brain. To grasp how ADHD can impair electrochemical communication in the brain, it is necessary to understand the basic principles of how neurons communicate (more information about this process is presented in Chapter 10, “Practical Aspects of Medication Treatments for ADHD”).

The building blocks of the human cortex are *neurons*, tiny cells that are only one-millionth of an inch across. Each neuron has a cell body on which develop thousands of tiny branches called *dendrites*; these dendrites receive information from other neurons. Each neuron also has one extension, called an *axon*, for sending information out to other cells; axons can range in length from less than a millimeter to more than a meter long. Neurons make contact with other neurons at junctions called *synapses*. Every neuron establishes 1,000 or more synapses with surrounding neurons. Neurons are not actually wired together; they do not touch each other.

At each synapse, there is a tiny gap between the back end of one neuron and the front end of the next. The whole network system works on low-voltage electrical impulses. Each of the messages carried between neurons is a tiny electrical charge of about 0.1 volt. As this moving charge reaches each synapse, it has to jump the gap like the spark of a spark plug. This jump across each synaptic gap depends on release of microdots of chemicals manufactured in each neuron.

Most neurons release just one specific transmitter chemical, although some make and release more than one. Each time a message-carrying

electrical impulse zips up to a synapse, that neuron releases microdots of its transmitter chemical, which allows that electrical impulse to jump across the synaptic gap to bind to receptors on the adjoining neuron, where the message may be carried forward to another neuron. This release can occur 1–100 times per second. If the electrical impulse crosses to open receptors, it will continue to move rapidly along to the next synapse and possibly many more circuits and branching connections; if the electrical impulse does not cross, it may simply diminish, blocked from further action.

In milliseconds after a transmitter chemical has been released, it is dissipated or pulled back into the sending neuron by proteins called transporters that act like little vacuum cleaners, rapidly sucking the transmitter chemical back in and repackaging it so it will be ready to be released again. This reuptake clearance of the transmitter chemical is essential. Without it, the system would be jammed.

Persons with ADHD tend to suffer from one or both of two problems with this electrochemical transmission process. The first problem is that the reuptake sometimes happens too quickly, so the transmitter does not connect sufficiently with the receptors to move the signal forward. Both of the two types of stimulant medications proven effective in alleviating ADHD symptoms, methylphenidate and amphetamine, have one primary function: they slow down the reuptake back into the transporters by fractions of a second, just long enough to improve chances of a good connection.

The second problem that may impair electrochemical communication in persons with ADHD is that there may be insufficient strength of the neuronal signal to get the message across the synapse. One type of stimulant medication shown to be effective for alleviating ADHD impairments not only slows reuptake, it also causes some increase in the amount of neurotransmitter released, which may facilitate a stronger signal; that medication is dextroamphetamine.

The effectiveness of medications in improving communication between neurons of the brain's management system provides the most impressive evidence of how the impairments of ADHD are linked to problems in communication within the brain. Over recent decades, hundreds of research studies have demonstrated that methylphenidate and/or dextroamphetamine can significantly improve cognitive and behavioral functioning for most children and adults with ADHD (Swanson et al. 2011). These medications cure nothing! They do not fix the problem of ADHD. However, for about 80% of persons with ADHD, these medications reduce ADHD symptoms and improve functioning during the hours of the day when the medication is active. For some, the

improvement is huge. For others, it is substantial but not huge. And for about 20% of those with ADHD, current medications for ADHD are not helpful or cause side effects that require stopping use of the medication.

Several different types of research have demonstrated how stimulant medications affect brain functioning in persons with ADHD. Several fMRI studies of children and adults have shown that stimulant medication can alleviate excessive distractibility typical of many with ADHD by reducing excessive drifting into default mode and strengthening task-focused networks (Peterson et al. 2009). Other fMRI studies of children with ADHD have shown that stimulant medication normalizes the attentional network and improves motivational networks for tasks (Rubia et al. 2009, 2011; Wong and Stevens 2012).

Positron emission tomography (PET) studies have demonstrated that stimulant medications can facilitate engagement of external task focus and deactivate the default mode network to reduce task disruption by excessive distractibility (Volkow et al. 2008, 2012). Other PET studies have shown that stimulant medications, when active, can enhance motivation for tasks that otherwise are uninteresting (Volkow et al. 2004). PET studies have also shown that methylphenidate and amphetamine in clinically appropriate doses can increase the amount of neurotransmitters such as dopamine and norepinephrine released into the synapse to improve signaling between neurons in specific circuits (Villemagne et al. 1999; Volkow et al. 2009).

Up to this point in this chapter, I have focused on what has been learned thus far about development of the brain, patterns of functional connectivity in the brain of individuals with ADHD, and electrochemical communication between neurons. In the remainder of this chapter, I focus on questions of when and how ADHD tends to get worse and/or better.

How ADHD Sometimes Gets Worse

When we say that a person's ADHD has gotten worse, what we usually mean is that the person's executive functions, his or her ability to manage himself or herself, have not yet developed enough to meet task requirements usually expected for a person of that age. As a child gets older, family, teachers, friends, and the wider community increase their expectations for how much a person is able to demonstrate adequate self-management. If the discrepancy between what that individual and most other persons of similar age are able to do is too great, people tend to say that he or she is behind in his or her development.

ADHD is a syndrome of impairments in certain brain functions that may cause more or less difficulty, depending on what that person needs to do in daily life. It is important to keep in mind that ADHD is not like an infection or a tumor that gets worse or better. It is a syndrome of impairments of the brain's development and cognitive functioning. To think about such impairments always involves the question "Impairment for what?" In Chapter 4, "Ways ADHD Can Impair Functioning at Various Age Levels," I describe some of the ways ADHD tends to impair certain functions in affected persons as they encounter tasks that they are expected to perform by a specific age. For example, a young child in preschool or kindergarten is not expected to be able to sit at a desk and do written assignments. If a child with ADHD in fourth grade is consistently unable to work independently on that task, the problem is not really that his or her ADHD has gotten worse. The problem is that the child's ability to master the demand for increased attention and self-control has not improved as much as is usually expected for that age.

Perhaps it would make more sense to ask "What factors make a person's ADHD more problematic?" than to ask "How does ADHD become 'worse'?" A number of factors may make an individual's ADHD symptoms become more problematic at a particular time of life or in particular situations. Some of these include the following:

- **Being required to undertake new challenges without sufficient support**

Most people would not expect or allow a 3-year-old child to cross a busy street alone. A child that young would not be expected to be able to look carefully at traffic coming from both directions, to accurately estimate the speed of oncoming vehicles, and to move carefully to cross when there is adequate space to get across safely. Any reasonable adult would want to provide careful assistance to help that young child get safely across the street until the child has matured enough to learn, remember, and use the skills needed to safely cross a busy street alone. We also know that some children need much longer to develop these skills than do others.

For some children with ADHD, academic skills such as learning to read, preparing for a spelling test, writing a book report, and keeping track of homework assignments are acquired as readily as for most others of similar age. However, for some, such tasks may be as challenging as it would be for a 3-year-old to cross a busy street alone. Some children with ADHD are very quick to pick up academic skills, but they consistently struggle more than most of their peers with social skills. They are slower to pick up cues from others about when

they are being too pushy or too demanding. They feel chronically bewildered about how to respond to classmates' teasing or how to get others to let them join in a conversation or a game. They may repeatedly be too bossy and be excluded by playmates, or they may simply retreat into solitary activities, avoiding the risk of peer rejection by immersing themselves in playing video games.

Some children with ADHD need much more support from parents or teachers for doing their schoolwork and/or managing social interactions. This need for extra support may emerge early in preschool years, or it may not become noticeable until the child enters middle school or high school, when more independent self-management is expected. For some, the need for extra support does not emerge noticeably until the adolescent is preparing to move away from home to go to college. For those who need such support and do not receive it or who receive too much support and do not have ample chances to learn to manage for themselves, such activities at various stages of development may become almost as perilous as trying to cross a busy street before they have learned how to do it.

- **Being criticized or punished repeatedly or harshly for failures they cannot adequately control**

Because children and adolescents with ADHD often fail to meet the usual expectations for their age, many are subjected to what they experience as endless criticism or harsh punishment from teachers, parents, siblings, and/or peers. "Why do you always keep doing what I've asked you repeatedly to stop doing?" "You keep promising that you will write down your assignments in your plan book, and then you keep coming home without doing it!" "Why should I keep helping you with your homework when you don't even bother to hand it in and get credit for it?" "You spend hours intently focused on playing your video games, but you claim you can't focus for just 20 minutes on doing your social studies homework."

Some children and adults report a long history of being told frequently while growing up that they were hopelessly lazy, stubborn, and stupid and destined for a life of failure. Usually, such verbal attacks result from intense and persistent frustration experienced by parents or others mystified by the child's seeming refusal to do what is expected, despite a variety of repeated efforts by the adult to encourage appropriate behavior. Such frustration is often intensified as the adult witnesses the child showing strong ability to focus and work persistently on a few self-selected tasks while consistently acting incapable of devoting comparable attention and effort to tasks the

adult views as important. This is the result of parents not understanding the “mystery of ADHD” described in Chapter 1, “Basic Facts and the Central Mystery of ADHD.”

- **Suffering from additional emotional, cognitive, or behavioral problems that may be co-occurring with ADHD**

Individuals with ADHD have a greatly increased likelihood of suffering from one or more psychiatric disorders at some time in their lifetime than do most others. One study of children with ADHD found that 62% had at least one other psychiatric disorder, whereas only 19% of population-based control subjects had any such disorder by the same age (Yoshimasu et al. 2012). This is a threefold increased risk of a comorbid disorder for those with ADHD. More than one-third of the children with ADHD in that study had two or more comorbid disorders, whereas just 8% of the control subjects had more than one. A nationally representative study found that adults with ADHD were more than six times as likely as the comparison sample to have an additional psychiatric disorder (Kessler et al. 2005, 2006).

This pattern of elevated risks for co-occurring disorders among persons with ADHD is described and explained more fully in Chapter 7, “How and Why Other Disorders Often Co-occur With ADHD.” In this chapter, the current point is simply that for many individuals, ADHD impairments are made worse by their struggles with excessive anxiety, persistent depression, compulsive behaviors, difficulties with mood regulation, learning disorders, or other psychiatric disorders that may be transient, recurrent, or persistently disruptive of their ability to perform the tasks of daily life.

One comorbid problem that warrants special mention is excessive use of alcohol and/or other drugs. A study based on pooled samples of more than 4,000 persons with ADHD and more than 6,000 control subjects without ADHD assessed at an average age of 18.9 years showed the magnitude of difference between these groups. Those with ADHD had 1.7 times the risk of a substance use disorder with alcohol, 2.05 with cocaine, 2.29 with marijuana, and 2.84 with nicotine. Overall, those with ADHD had more than two and a half times the risk of having a substance use disorder with one or more of these addictive substances by early adulthood (Lee et al. 2011).

For many persons with ADHD, the overuse of alcohol, marijuana, or other drugs begins with an effort to self-medicate. Often, they struggle daily with feelings of frustration, embarrassment, disappointment, or shame resulting from their ADHD impairments. Occasional use of these substances may, for a time, bring welcome, although very tem-

porary, relief from these painful emotions. The problem is that occasional use can readily lead to more chronic use, which can rapidly lead to a persistent cycle of addiction from which it may be extremely difficult to recover. Addiction to these substances can result in worsening of ADHD impairments in multiple aspects of schooling, employment, social relationships, and other areas of daily life.

- **Stresses resulting from environmental adversities**

Although the primary cause of ADHD is genetic, adverse environmental factors may have considerable negative impact on the life experience of children and adults with ADHD. Examples of environmental adversities include serious medical or psychiatric illness of a parent or other close family member, domestic violence, living in a dangerous neighborhood, separation or divorce of parents, layoff or loss of employment, multiple changes of residence, lack of or loss of health insurance, and serious disability or death of a parent or other close family member.

Such adversities may occur in isolation with just transient effects followed by full recovery. In other cases, adversities may be persistent and may trigger additional adversities. For example, if a parent who has been the primary wage earner for the family suffers a major injury or protracted disabling illness, the parent could lose his or her job and with it health insurance for himself or herself and the family; this could also result in eviction, forcing a move into a more dangerous neighborhood.

Although such adversities can create overwhelming difficulties for any family, their impact may be compounded in a family in which one or more family members have ADHD; the difficulties can worsen considerably if one or both parents have ADHD and are trying to cope with the added stress that results from raising children with ADHD. One study of more than 200 adult patients with ADHD found that those whose ADHD symptoms were more severe tended to have more major adversities than did those whose ADHD symptoms were less impairing (Garcia et al. 2012). One secondary effect of such difficulties is that some adolescents in families suffering significant adversities feel an obligation to remain at home longer than they might otherwise, sometimes sacrificing their own educational or employment opportunities to provide economic and/or emotional support to parents, siblings, or other family members.

- **Bodily changes of aging along with their ADHD symptoms**

Many discussions of ADHD refer to it as a developmental disorder, but generally, the focus of such discussions is limited to the first

decade or two of life; they do not encompass the full range of development across the life span. Yet the few studies that have explored ADHD during adulthood, especially those that have looked at midlife and beyond, clearly indicate that for those individuals whose ADHD persists into middle adulthood and beyond, significant impairments tend to remain and sometimes worsen.

One population-based study of more than 2,000 men and women ages 47–54 years found that 6.2% reported significant symptoms of ADHD; no difference in ADHD symptoms was found between men and women in this sample (Das et al. 2012). Evaluation of those who reported significant ADHD impairments found that those individuals were less likely to be employed full-time, struggled more with physical health problems, and reported more problems in personal relationships and in their personal finances as well as lower quality of social life and well-being.

With or without ADHD, there are a number of physical changes associated with aging in both males and females. Imaging studies have demonstrated age-related decline in various elements of the brain that provide infrastructure for executive functioning, even for healthy adults without ADHD (Backman and Farde 2005; Gazzaley and D'Esposito 2005; Raz 2005). Volkow et al. (1996) found a 6.6% decrease per decade of life in availability of dopamine transporters in healthy volunteers. Age-related decline in brain dopamine activity even in healthy volunteers has also been documented in several other regions of brain important for executive functions.

White matter decreases in the brain are also associated with aging in the general population. One study found that the total length of white matter fibers decreases by 10% per decade of life in the general population, up to a total decline of about 45% by age 80 years, with about a 16% greater average decline in females (Marner et al. 2003). It should be noted, however, that these percentages of decline in the general population are based on averages that may mask considerable variability among various individuals.

Very little research has assessed ADHD in the geriatric population. Many health care practitioners tend to assume that any attentional difficulties experienced by elderly individuals are due simply to the slow degenerative processes of aging or, possibly, to the early stages of dementia. Adult patients sometimes fear that their ADHD predisposes them to onset of Alzheimer's or some other variety of dementia. Currently, there is no evidence to support that assumption.

ADHD in the older population may be mistakenly diagnosed as mild neurocognitive disorder, a disorder that involves some cogni-

tive decline that does not interfere with the capacity for independence in everyday activities. Mild neurocognitive disorder is sometimes, but certainly not always, a prelude to onset of dementia. Screening for ADHD in any elderly person who presents with symptoms of mild neurocognitive disorder may be helpful not only for increasing understanding of possible relationships between these two disorders but also for identifying adults whose cognitive impairments may be due to lifelong problems with ADHD rather than to geriatric deterioration (Ivanchak et al. 2012).

Changes associated with menopause are an aspect of aging that is associated with cognitive impairments similar to ADHD. Women with no childhood history of ADHD, many of them well-educated and high-functioning businesswomen and professional women, report onset of ADHD-like impairments of working memory, organizational skills, and ability to sustain focus that appear coincident with their decline of estrogen and cessation of their menses. This association makes sense in that estrogen is one of the primary modulators of the release of dopamine in the female brain. Insufficiency of dopamine in the brain networks that manage executive functions is one of the major problems associated with ADHD. Studies published by groups at Yale and the University of Pennsylvania have demonstrated that medications used for treatment of ADHD may help to alleviate these midlife-onset impairments of executive functions (Epperson et al. 2011, 2015; Shanmugan et al. 2017).

- **Lack of appropriate diagnosis and treatment**

Another factor that may contribute to increased impairment from ADHD is lack of appropriate diagnosis and treatment. Among children in the United States ages 4–17 years who have been diagnosed with ADHD, approximately 17.5% received no treatment for their ADHD. However, there is great geographical variability in the availability and use of treatment for this disorder. An analysis of treatment patterns in the United States found that the percentage of children with ADHD who received treatment ranged from a low of 2% in some states to a high of 10.4% in others (Visser et al. 2014).

One survey reported that 49.7% of adults in the United States diagnosed with ADHD had received at least some professional care for emotional problems, but only 10.9% of those had received treatment specifically for ADHD. For most, treatment was given for anxiety, depression, or some other psychiatric problem, without treatments likely to be directly helpful for alleviating ADHD impairments (Fayyad and Kessler 2015).

How ADHD Sometimes Improves

- **Brain development may be delayed but then catch up.**

As was mentioned in the section “Brain Structure and Maturation,” delays in brain development characteristic of ADHD sometimes improve. Shaw et al. (2007) found that the usual pattern of cortical proliferation followed by pruning to develop more efficient circuits tended to be delayed by approximately 3–5 years in persons with ADHD. Several of the imaging studies described in that earlier section of this chapter reported on participants who were found to have ADHD in childhood but no longer met criteria for ADHD when they were evaluated in adulthood. It is not unusual for children who manifest ADHD symptoms of hyperactivity and/or impulsivity to outgrow those symptoms during early adolescence, but for 70%–80% of those with ADHD symptoms in childhood, impairments of executive functions related to attention tend to persist into adulthood. This means that for 20%–30% of children with ADHD, ongoing, although belated, brain development eventually improves functioning.

The answer to the question of how long ADHD impairments persist past childhood depends on how persistence is defined. Biederman et al. (2010a) found that adults who were treated for ADHD diagnosed in childhood tended to fall into one of three categories: 1) full syndrome persistence (fully met all of the official diagnostic criteria for ADHD), 2) symptomatic persistence (met more than half of the official diagnostic criteria for ADHD), and 3) functional impairment (did not meet official diagnostic criteria but were continuing to take medication for ADHD).

Using these categories, a follow-up study of boys diagnosed with ADHD found that when they reached their early 20s, 35% of them still met full diagnostic criteria, 22% had symptomatic persistence, 6% were in the functional impairment group, and 22% no longer fit any of the three categories for continuing to have ADHD impairments (Biederman et al. 2010a). A study assessing girls diagnosed with ADHD found that 33% continued to meet full diagnostic criteria, 29% met the partial symptoms criteria, and 33% were no longer impaired by ADHD (Biederman et al. 2010c, 2012).

- **Supportive relationships with particular family members, teachers, mentors, or friends provide guidance and encouragement.**

Just as adversities within the family or community may complicate and impair the development of children, adolescents, or adults

with ADHD, an ongoing relationship with a particular parent, grandparent, older sibling, or other family member may provide emotional support and stabilizing guidance for someone with ADHD. In some situations, it may be not a family member but a particular teacher, coach, neighbor, therapist, or perhaps even a peer who becomes a close friend, confidant, and advisor to help the growing person with ADHD feel recognized, appreciated, and encouraged to deal with frustrations, avoid potential trouble spots, and develop his or her personal strengths. It is difficult to overestimate the value and benefits that such a relationship can provide at critical points in the life and development of an individual with ADHD.

- **After completion of basic schooling, some individuals find success in work that better fits their interests and skills.**

Usually, the most difficult times for persons with ADHD are their years from middle school through the first few years after high school. Those are the years when students are faced with the widest range of tasks to do and the least opportunity to escape from the tasks that they struggle with or find to be boring. As they progress in their education, some who are fortunate may discover areas of study in which they have strong interest and abilities. They may then be able to progress to more specialized study in those areas, which may eventually lead them to a career for which they are particularly suited.

Some students who are especially strong in quantitative thinking and data analysis but struggle with reading or writing papers may move into studies in accounting, finance, or computer science, where they can develop their specialized strengths without pressure to continue with intensive work with words. Likewise, some who struggle with math while having strengths in verbal communication may meet the minimum requirements for study of math while developing their skills in other areas that depend more on use of oral or written language. Others may specialize in technical, mechanical, artistic, or scientific domains that do not require work in areas in which they are less competent.

In some work settings, one can delegate to others tasks that are problematic for oneself. For example, a tradesman who is skilled in doing construction or plumbing or electrical work but struggles to keep up with billing and office tasks may develop his business sufficiently to hire a part-time or full-time secretary or office manager who can respond to phone inquiries, schedule appointments, and manage billing and bookkeeping tasks, leaving the tradesman to devote himself fully to the work he does best. A business executive may

fulfill major responsibilities for planning and managing diverse operations of her business organization and demonstrate excellent leadership skills, while depending heavily on the support of an administrative assistant who helps to organize her incoming communications, plan her schedule, and manage daily operations.

- **Some individuals develop a relationship with a partner in which each can complement the strengths of and help compensate for the weaknesses of the other.**

In adulthood, some individuals with ADHD are able to develop and maintain a relationship with a partner in a work situation or in family life who is able and willing to take care of some aspects of life that the person with ADHD finds more difficult. At the same time, the partner benefits from the contributions of the person with ADHD. For example, some businesses thrive with a leadership team in which one member manages production of a product or service while the other member manages marketing and sales of the product or service. In some marriages, one partner may take primary responsibility for managing the household and family finances, while the other takes a lesser share of those responsibilities and contributes primarily to supporting the family by generating income. Difficulties that often emerge with such shared responsibilities, especially in relationships in which one or both partners have ADHD, are discussed in Chapter 9, "Emotional Dynamics in Individuals, Couples, and Families Coping With ADHD."

- **Some individuals who have ADHD complicated by another disorder may recover from that other disorder and thus be better able to manage their ADHD.**

One example of such recovery is the individual who has struggled with excessive drinking or excessive use of marijuana or other drugs, perhaps during the late teens and early adulthood, and then is able to recover from that addiction and maintain abstinence or adequate control over the excessive substance use. Research indicates that a majority of those addicted quit using illegal drugs by age 30 (Heyman 2013).

For those seriously addicted to drugs or alcohol, such recovery is not easy to gain or maintain, but many do manage to put their excessive drinking or drug use behind them as they enter their 20s or 30s. This might occur after a stint in a rehabilitation program or sustained participation in a 12-step program or other treatment program, but often it occurs without professional assistance (Heyman 2013). Usu-

ally, the first few years of recovery are the most difficult, as the individual struggles to cope with a variety of emotional problems that may have been the initial precipitants of the excessive substance use. In some cases, recovery is helped substantially by the individual's finding productive work, which provides satisfaction and financial rewards that give the person in recovery motivation to continue to sustain their recovery.

Another factor that helps some persons who have substance use disorders, persistent depression, or excessive anxiety is finding someone with whom they are able to develop a close friendship or perhaps even a life partnership. Finding and sustaining a mutually beneficial relationship with someone can be a strong factor in helping individuals make important changes in their previous maladaptive lifestyle.

- **Some individuals develop compensatory strategies that allow them to deal with some of their ADHD-related impairments.**

Some persons with ADHD eventually find ways to develop habits or routines that prevent their ADHD symptoms from disrupting their lives. Such compensatory strategies can be as simple as consistently placing one's keys in a particular place beside the door immediately on entering the house or utilizing reminders on one's cell phone for help in remembering to take pills on schedule each day. Other strategies may include maintaining an electronic or day-timer calendar for keeping track of all appointments and utilizing a "To Do" list with each item assigned a 1, 2, or 3 priority value and a set time for reviewing and revising that list once or twice each day to monitor progress and keep the task list and appointment schedule within manageable bounds.

Another strategy some persons with ADHD find helpful is to employ an ADHD "coach" who has been trained to help those with ADHD identify areas of difficulty in their daily functioning and then to provide assistance with developing better coping strategies to manage specific problems. The coach should also provide frequent phone or face-to-face accountability monitoring and support for the stated goals.

- **Some individuals are fortunate enough to receive adequate assessment and effective treatment for their ADHD with or without co-occurring disorders.**

An important factor that can help most persons with ADHD is finding and working with an adequately trained medical or mental

health professional who can provide adequate assessment and treatment for ADHD symptoms and any co-occurring disorders. Many professionals claim that they can provide such services, but it is not always easy to locate an adequately trained professional who is accessible both in terms of getting an appointment within reasonable travel distance and affordability of the necessary services. Some medical insurance plans provide adequate coverage for such assessments and treatments; others do not. However, even when cost is not a problem, finding the right clinician and getting needed appointments can be quite difficult.

Even when a competent clinician is available, there is still a need to clearly assess the ADHD impairments, to tailor an effective plan for treatment, and to sustain that treatment relationship for adequate monitoring and adjustments of the treatment process. Elements of what constitutes an adequate assessment and treatment program are discussed in Chapters 10 and 11.

Summary

This chapter begins with an explanation of the primary cause of ADHD: it is genetic. This disorder is highly heritable; however, what is inherited is not the disorder itself but vulnerability to the disorder. Environmental factors play a significant role, directly and indirectly influencing brain development and functioning. Several major ways in which research has demonstrated that brain development and functioning in individuals with ADHD differs from those who do not have ADHD are also described: 1) brain structure and maturation; 2) maturation of functional neural connectedness within the brain; and 3) dynamics of electrochemical communications in the brain.

ADHD is not a static condition. Across situations and over the course of a lifetime, sometimes it gets worse and sometimes it gets better. This chapter outlines six factors that may cause ADHD impairments to worsen and seven factors that may help to improve the functioning of those with ADHD in ways that significantly enhance their functioning and reduce their impairments in daily life.



How and Why Other Disorders Often Co-occur With ADHD

MOST CHILDREN, ADOLESCENTS, AND ADULTS who have attention-deficit/hyperactivity disorder (ADHD) also have one or more additional learning or psychiatric disorders at some point in their life. Sometimes, both ADHD and another disorder appear in early years. The Collaborative Multisite Multimodal Treatment Study of Children With Attention-Deficit/Hyperactivity Disorder enrolled 579 children ages 7–9 years who had ADHD. After careful evaluation, 70% of those young children were found to have already had at least one additional psychiatric disorder in the year prior to enrollment in the study (Jensen et al. 2001).

A larger study involving 61,000 children ages 6–17 years found that the 8.2% of children who had ADHD had much higher rates for other disorders than did children who did not have ADHD (Table 7–1). Among the children in the ADHD group, 33% had at least one additional psychiatric or learning disorder, 16% had two, and 18% had three or more (Larson et al. 2011).

The National Comorbidity Survey Replication found that of adults ages 18–44 years who had not been referred for treatment, those with ADHD were far more likely to have at least one additional psychiatric disorder at some point in their life (Kessler et al. 2005, 2006). Table 7–2 shows the lifetime prevalence of other disorders in this sample and the

TABLE 7–1. Psychiatric disorders diagnosed in children with and without attention-deficit/hyperactivity disorder (ADHD)

	ADHD (%)	Non-ADHD (%)
Learning disability	46.1	5.3
Conduct disorder	27.4	1.8
Anxiety	17.8	2.1
Depression	13.9	1.4
Autism spectrum disorder	6.0	0.6

Source. Adapted from Larson et al. 2011.

odds ratio for each disorder. An odds ratio of 1.0 indicates that prevalence of the disorder is the same for persons with ADHD as for persons of the same age in the general population; 3.0 indicates three times the base rate of persons of the same age in the general population.

Data from these three studies (Collaborative Multisite Multimodal Treatment Study of Children With Attention-Deficit/Hyperactivity Disorder, National Survey of Children's Health, and National Comorbidity Survey Replication) highlight the fact that children and adults with ADHD tend to have significantly more learning or psychiatric disorders than those without ADHD. This raises an important question: Why is it that children and adults with ADHD are so much more likely to have multiple learning or psychiatric problems? Are they just especially unlucky?

One possible explanation for the high rates of co-occurring disorders associated with ADHD is that ADHD is not just one more among other psychiatric disorders. It is a foundational disorder in that executive function impairments of ADHD also underlie many other disorders. Neuroscientist Joaquin Fuster (2003) emphasizes the critical role of attention, broadly defined, for all aspects of cognitive activity:

Perception is part of the acquisition and retrieval of memory; memory stores information required by perception; language and memory depend on each other; language and logical reasoning are special forms of cognitive action; *attention serves all the other functions.* (p. 16, emphasis added)

Fuster (2003) describes the term *attention* as a system of higher neural networks that manage and integrate other neural networks. He speaks of attention networks as activating, inhibiting, and prioritizing neural networks that control perception, thought, and action. He refers

TABLE 7–2. Lifetime prevalence and odds ratio for psychiatric disorders in persons with attention-deficit/hyperactivity disorder

	Lifetime prevalence (%)	Odds ratio
Mood disorders	38.3	5.0
Anxiety disorders	47.1	3.7
Substance use disorders	15.2	3.0
Impulse disorders	19.6	3.7

Source. Data from Kessler et al. 2006.

to attention networks as crucial for regulating arousal and activation, for selecting what stimuli will be attended to, and for integrating feedback from bottom-up and top-down control of motivations. He also describes working memory as an aspect of the attention system. His view of attention is very broad and incorporates essentially the same cognitive functions included in the six-cluster model of executive functions presented in Chapter 2, “A New Model of ADHD.”

Fuster’s point may be illustrated with an analogy: If the PowerPoint software on your computer malfunctions, it is likely to cause difficulty with your making and using slides, but it is not likely to impair your Excel, Word, or other software programs. However, if the Windows operating system of your computer is disrupted, that is likely to disrupt the functioning of many, if not all, of the software programs on your computer. Similarly, impairments of ADHD may disrupt multiple cognitive functions, some of which may be involved in disorders other than ADHD. Directly and indirectly, ADHD-related impairments tend to have broad impact on many aspects of cognitive functioning, which may contribute to multiple impairments of other learning or psychiatric disorders. In the following sections, I describe ways in which executive function impairments of ADHD may contribute to various disorders that often co-occur with ADHD.

Specific Learning Disorder

How Is ADHD Related to Specific Learning Disorder?

Specific learning disorder is defined by DSM-5 (American Psychiatric Association 2013) as “characterized by persistent and impairing difficulties

with learning foundational academic skills in reading, writing, and/or math” (p. 32). Learning disorders are very common among individuals with ADHD. A large clinical study of children ages 6–16 years diagnosed with ADHD found that 76% met diagnostic criteria for one or more identified learning disorders (Mayes and Calhoun 2007). The most frequent learning disorder in this group of 678 children was disorder of written expression (65%); frequency of reading disorder was 32%, and the rate for mathematics disorder was 30%. These percentages are for those who met diagnostic criteria for a specified learning disorder; many of the other children in the sample had significant chronic difficulties with one or more aspects of learning but did not meet full criteria for diagnosis of a specified learning disorder.

For many years, learning disorders such as reading disorder (dyslexia), mathematics disorder (dyscalculia), and disorder of written language were considered completely separate from ADHD. More recent research has found that, although there are certainly differences between learning disorders and ADHD, impairments of executive functions associated with ADHD are closely related to the impairments of learning disorders. Many persons with learning disorders also have the impairments of executive functions of ADHD, even though some clinicians still do not notice those connections.

There was a time when most educators and psychologists considered dyslexia to be essentially a problem of being able to recognize and remember which combinations of letters make which particular sounds. Teaching students phonics or other systems of skills to decode words was seen as the key to helping students with dyslexia to read and understand what they were reading. This view was challenged in 2008 by dyslexia specialists Sally and Bennett Shaywitz, who argued that reading is not simply a modular process depending solely on being able to decode words; it also involves attention mechanisms that are essential to fluency and automaticity, the ability to read fluently.

Thus, the critical requirement for automaticity is for the reader to encode the relevant items in memory and to retrieve them on a subsequent encounter, and for both encoding and retrieval, attention is central. (Shaywitz and Shaywitz 2008, p. 1332)

How Are Executive Function Impairments Related to Specific Learning Disorder?

More recently, other specialists in learning disorders have recognized the critical importance of attention, working memory, and processing speed in reading fluency and comprehension. These executive functions

are not so important for decoding and pronouncing single words, but they are critical for comprehension of sentences and paragraphs. This was described by Sesma and colleagues (2009):

Reading comprehension is inherently more complex than single word reading....[E]xecutive control skills such as planning and working memory become more necessary as the length and complexity of written text increases. (p. 8)

Comprehension of more complex text requires the ability to keep in mind the main ideas or information presented in the text, both within individual paragraphs and in the text as a whole. While reading, one continually needs to update understanding of connections between these elements to build and revise one's mental pictures of information, ideas, or actions generated by what is being read. Research has shown that persons with ADHD tend to have more difficulty with these processes than do those without ADHD (Miller et al. 2013), probably because of the working memory impairments that are common in ADHD (Carretti et al. 2009).

Executive functions are also important in math. One study of first- and second-grade students found that those students who had low achievement scores in math tended also to have more difficulties in working memory. Researchers found that the scores of those children on tests of working memory were better predictors of achievement in math problem solving than were their scores for mastery of basic math skills (Alloway et al. 2010; Toll et al. 2011). This makes sense if one considers the importance of working memory for keeping track of the correct sequence of operations and also for holding in mind when one has borrowed or carried over numbers from one column to another.

Executive functions are also strongly associated with disorder of written expression. Our group at Yale compared scores on individually administered achievement tests given to 145 adolescents with ADHD ages 13–25 years; we found that for 70% of that group, their scores on written expression were their lowest scores, significantly below their scores for reading and for math (Brown et al. 2010). A large study that compared children with and without ADHD found that 46.9% of those with ADHD suffered from disorder of written expression, whereas only 9.6% of those without ADHD manifested that learning disorder (Yoshimasu et al. 2011).

It is not surprising that individuals with ADHD struggle more with written expression than with reading or math. Written expression places much greater demands on executive functions than do reading or solving math problems. When reading, one begins with words already in

sentences; when doing math, one starts with a stated problem. However, when translating thoughts into sentences and paragraphs on a blank screen or piece of paper, we must focus in order to plan and organize our thoughts in coherent sequences, deciding what to say first, selecting appropriate words and images, and deciding how much to elaborate and what to delete so we say enough to communicate each thought and not so much that the writing is boring or redundant. We need to maintain connections within each paragraph while also keeping in mind links with what we have written in preceding paragraphs and also what will follow. Then, we need to review and revise to clarify and shape our intended message. All of these functions require integrated operation of our executive functions.

Another aspect of executive functions essential to reading, mathematics, and written expression is activation—alertness and motivation to perform the tasks. If a person is not motivated to read a text or to try to solve a math problem or to write sentences and paragraphs, those tasks are not likely to be adequately done, even if the person has the requisite skills. A study of junior high students who were asked to read social studies texts found that the importance a student attributes to reading a particular text is a more important determinant of whether or not the student will comprehend a text than is the individual's cognitive capacity to read well.

[C]omprehension of challenging text seems to require not only cognition, but also motivation...beliefs about how important it is to do well on given tasks, how useful those tasks are in relationship to current and future goals, and how intrinsically interesting they are to the individual. (Anmarkrud and Braten 2009, p. 252)

These findings are quite consistent with the description of situational variability of ADHD symptoms provided in Chapter 1 ("Basic Facts and the Central Mystery of ADHD"). A specific example of the impact of motivation on reading was provided by a college student with ADHD, who observed,

If I'm reading some text that doesn't really interest me, it's as though I'm just licking the words and not chewing them. My eyes go over each word and I understand what all of it means as I'm reading it, but I'm just not engaged enough to get the information to stick inside my head. (Brown 2013, p. 140)

Data and examples in this section have highlighted various ways that executive function impairments of ADHD can contribute to learn-

ing disorders such as reading disorder, mathematics disorder, and disorder of written expression. Yet it is important to keep in mind a dimensional view of these functions. Although many individuals with ADHD have sufficient impairment to warrant diagnosis of a specific learning disorder in reading, writing, or written expression, many others with ADHD who do not qualify for a diagnosis of a specific learning disorder are impaired in their ability to read with comprehension, to work effectively in solving math problems, and/or to give written expression to their thoughts. Executive functions impaired in ADHD can cause difficulties in one or several of these skills in ways that are significant, even if they are not sufficiently severe to warrant a diagnosis of specific learning disorder.

Anxiety Disorders

How Is ADHD Related to Anxiety Disorders?

Anxiety disorders are much more common among children and adults with ADHD than in the general population. In samples of children with ADHD, the incidence of anxiety disorders ranges from 9.6% to 34% (Jensen et al. 2001; Yoshimasu et al. 2012). Among adults with ADHD, rates range from 27.9% to 47.1% (Kessler et al. 2005; Van Ameringen et al. 2011). A meta-analysis found that across multiple studies, the average rate of anxiety disorders in children with ADHD was three times the rate among children in the general population. A nationwide study of adults with ADHD found the rate of anxiety to be 3.7 times as high as among the general population of adults in the United States.

Anxiety disorders come in many different forms. Some individuals have just one anxiety disorder, whereas others are burdened by several types of anxiety disorders. Many children and some adults have *phobic fears*. For example, they may get very tense, worried, and upset when they get near to or expect very soon to get too close to a dog. Suddenly, their heart beats a lot faster, they imagine themselves being attacked by the dog, they feel panicky, and they want to get away from the dog as quickly as possible. They then want to continue to avoid that dog and, perhaps, any other dog. As soon as they can avoid the dog and safely stay away from it, the fear usually diminishes quickly. Other examples of phobia include intense fear of snakes, bees, thunder and lightning, being in high places, getting an injection, seeing blood, or flying in an airplane.

Many children and some adults have one or more such fears that are stronger, more persistent, and more problematic than is usual for their

peers. Usually, fears are not diagnosed as phobic unless they are markedly more intense, more frequent, and significantly out of proportion to any actual danger posed by the specific object or situation.

Social anxiety is a type of phobia in which a person is almost always intensely fearful of getting into social situations with others whom they do not already know and trust. They worry that other people will see them as unappealing, boring, ridiculous, incompetent, socially awkward, ugly, immature, offensive, stupid, or in some other way not fitting in with others in the situation. To warrant diagnosis, this anxiety must be way out of proportion to any realistic threat in the situation. For children, this diagnosis is fitting only if the social anxiety occurs not only with adults but also with peers.

Sometimes social phobia appears only when the person enters into an unfamiliar group or situation where he or she will be expected to interact with others. For others with social phobia, their fear is just as intense even if they are simply eating in a restaurant or doing some other activity among strangers where they may be observed or expect to be noticed by others.

The primary way that those with social phobia usually try to avoid feeling too anxious is to stay away from unfamiliar situations where they believe they are likely to have to interact or to be observed in a negative way. Often, their fear is not only that they will be overtly treated in a negative way; they are often intensely intimidated by what they assume others are thinking about them, even if other people are not speaking to or even actively noticing the worried person. Typically, the social anxiety does not occur when the person is with family or others whom he or she knows well and trusts to not be exaggeratedly critical or rejecting.

Another type of anxiety disorder is *panic disorder*: brief but recurrent episodes of sudden, overwhelming fear. Typically, a panic attack involves sudden onset of dizziness, sweating, trembling, shortness of breath, chest pain, and rapid heart rate, sometimes with pounding heart sensations that cause the person to feel that he or she is suffering a heart attack and is about to die. For some people, these terrifying sensations come without any warning and are not associated with a known fear; they usually subside within 10 or 15 minutes. For others, a panic attack may be expected to occur because they are approaching a setting or situation in which a panic attack has been experienced previously. Panic attacks may occur once or twice a week for months at a time, or they may be experienced in frequent batches (e.g., once or more often every day for a week or two) and then not for many months. Often, the most problematic aspect of panic disorder is the individual's worrying intensely about when and where another panic attack might occur.

For some individuals, panic disorder is associated with *agoraphobia*, an intense and persistent fear of leaving one's home or usual "comfort zone" without being accompanied by a trusted person. This anxiety disorder is often persistent and chronic; it is very difficult to treat.

One additional type of anxiety disorder is *generalized anxiety disorder*, which involves a persistent pattern of excessive, uncontrollable worry and anxiety about many possible events or activities. Primary symptoms include protracted periods of subjective distress and feeling keyed up, restlessness with inability to relax, chronic muscle tension, difficulty concentrating, being fatigued easily, chronic irritability, and difficulty falling asleep or staying asleep. Often, persons with generalized anxiety also experience physical symptoms of stress such as chronic headaches, migraines, psoriasis, reflux, nausea, diarrhea, or irritable bowel syndrome.

How Are Executive Function Impairments Related to Anxiety Disorders?

There are significant differences between ADHD and the various anxiety disorders, but some or many executive function impairments may also play a significant role in anxiety disorders. Research has found that attentional bias to possible threat plays an important role in many types of anxiety disorder. The term *attentional bias* refers to the tendency of an individual to be consistently hyperalert to any perceptions that might suggest a potential threat of physical or social/emotional danger. Not only are individuals alert to such signs, they tend to seek out and focus on such potential threats in ways that magnify their worry about the perceived threat, while ignoring other potentially relevant information (Shechner et al. 2012). Anxious individuals tend to be biased in their information processing at several levels: in what they focus their attention on (orienting), in how they size up situations they encounter in terms of likely impact on them (appraisal), and in what patterns of response they have found helpful for them (learning and behaviors) (Britton et al. 2011). As a result of this bias, they tend to have considerable difficulty in shifting their focus to attend to the larger context of what they perceive. These patterns can become self-reinforcing.

Attentional bias toward possible threats is especially common in boys and girls who in infancy are exaggeratedly fearful of novelty and who in early childhood tend to be excessively shy and overly cautious (Kagan 2010). Longitudinal studies have shown that attentional bias in such children tends to persist into young adulthood and is associated with patterns of connectivity in brain circuits that intensify anxious reactions to various stimuli (Hardee et al. 2013). Neural circuits of their

brains seem to become “wired” to have hair-trigger responses to any potential threat. This can cause these individuals to develop chronic stress and a behavioral tendency to be consistently overly cautious and excessively guarded.

Another aspect of executive functions that plays an important role in anxiety disorders is working memory. Numerous studies have demonstrated that persons with stronger working memory capacity tend to have stronger ability to regulate their emotional responses, minimizing excessively strong emotional responses (Schmeichel et al. 2008). Weakness of working memory is one of the primary impairments associated with ADHD (Alderson et al. 2013; Fried et al. 2016; Kennedy et al. 2016; Martinussen et al. 2005). Because stronger working memory is associated with greater ability to modulate emotional responses, it is not surprising that many persons with ADHD also have significant difficulty in modulating their anxiety. They are more likely to have difficulty keeping in mind additional relevant information that may, for others, reduce the tendency to overreact to potential physical or social/emotional threats.

Depressive Disorders

How Is ADHD Related to Depressive Disorders?

Children and adults with ADHD have considerably greater likelihood of having a depressive disorder sometime in their lifetime than do persons without ADHD. Rates for depression in children with ADHD range from 9.6% to 34%, much higher than the 1.4%–7.2% in the general population of children. A meta-analysis of 21 epidemiological studies found that the odds of a youth diagnosed with ADHD also being diagnosed with depression are more than fivefold higher than for youth without ADHD (Angold et al. 1999).

The importance of depression in children with ADHD is highlighted by research that demonstrated that children with ADHD and comorbid mood disorders are three times more likely to complete suicide than those diagnosed with either ADHD or mood disorder alone (James et al. 2004). Rate of depression for adults with ADHD is approximately 31%, considerably above the 17% rate for adults in the general population (Kessler et al. 2006).

One of the two major types of depression is *persistent depressive disorder* (formerly *dysthymia*). This diagnosis is not usually made unless the person has suffered from this syndrome for at least 2 years (1 year for children or adolescents). One of my young adult patients described his experience with persistent depressive disorder as follows:

For the past couple of years, I've been walking around feeling bummed out. I can still keep doing most of what I need to do each day, like getting to work and picking up groceries once in a while. But I almost never enjoy any of it, including things I really used to enjoy doing, like seeing my friends and going out. I don't have much energy, and I tend to get down on myself quite a bit. Occasionally, something interesting will happen and I can get into that for a while, but as soon as the interesting part is over, I go right back to that same dark feeling: "Everything sucks, everything always sucks, everything always will suck. That's just the way it is."

The other primary type of depression is *major depressive disorder*. This is similar to persistent depressive disorder, but it is much more intense and more immobilizing and involves more disruption of eating and sleeping. Often, it also involves preoccupation with thoughts of death and the possibility of suicide. One patient with this disorder reported,

It's been nearly 2 months now, and almost every day I feel completely hopeless. Often, I feel dead tired but just can't get to sleep, or I fall asleep for a few hours and then I'm wide awake and can't get back to sleep even though it's the middle of the night. There have been a few times when I've stayed in bed for a couple of days, half sleeping or half awake, just getting up once in a while to get a drink of water or use the bathroom, not able to get myself to go to work or do anything productive. I don't feel like talking with anybody and I don't feel like eating much of anything. When I'm awake, I just keep thinking about how much of a hopeless failure I've always been and how everyone would probably be better off if I weren't around anymore.

Episodes of major depressive disorder may last for just a few months or for a year or more. Some people have just one such episode in their lifetime. Others may have recurrent episodes of major depression interspersed with periods of no depression. Still others suffer from persistent depressive disorder for much of their life, with episodes of major depression occurring from time to time.

How Are Executive Function Impairments Related to Depressive Disorders?

Although current diagnostic criteria for ADHD include no symptoms of problems with emotions, research on persons with ADHD suggests that problems with regulation of emotion are an important aspect of executive function impairments. Clinical data from various samples and theoretical arguments described by Barkley (2010) and Brown (2005a, 2014) suggest that problems in emotional regulation constitute a significant aspect of the core problems of persons with ADHD. A review paper by Shaw et al. (2014) summarized research relevant to this issue.

Data from normed rating scales used to identify persons with ADHD also support the importance of emotional regulation in those with ADHD. Conners' Adult ADHD Rating Scales (Conners et al. 1999) include two items related to anger regulation ("still throw tantrums," "short-fuse, hot temper") and two items related to depression ("lack faith in my abilities," "hard to believe in myself") in the ADHD index that comprises the 12 statistically best items for identifying adults with ADHD. Data from the Brown ADD Scales for Adolescents and Adults (Brown 1996) indicate positive correlations between responses to items related to emotional regulation ("excessively impatient," "sensitive to criticism," "easily irritated," "depressed mood") and the total score for all five clusters of impairments of executive functions.

Several studies have shown that problems in emotional regulation are a primary factor underlying depression in youth, both in the general population of children and adolescents and in samples of youth with ADHD (Durbin and Shafir 2008; Feng et al. 2009; Melnick and Hinshaw 2000; Walcott and Landau 2004). One recent study demonstrated that the relationship between ADHD and depressive symptoms in youth is not just partially but is fully mediated by impairments in emotional regulation typically found in those with ADHD (Seymour et al. 2012).

Research mentioned in the section "How Are Executive Function Impairments Related to Anxiety Disorders?" about the relationship between ADHD working memory impairments and elevated rates of anxiety in persons with ADHD is also relevant to the elevated rates of depression in those with ADHD. Research by Schmeichel et al. (2008) included the hypothesis that persons with stronger working memory are better able to regulate their reactions to depressive feelings as well as to feelings of anxiety. Impairments of working memory characteristic of most persons with ADHD are likely to be a significant factor in their relative weakness in regulating both types of emotion. The mechanism of this is actually quite simple. If a person is relatively weak in his or her ability to keep multiple bits of information in mind at the same time (weak working memory) when confronted with situations that trigger anxious and/or depressive emotions, that person is likely to get more intensively engaged with those negative emotions than is someone who is better able to keep in mind other information (stronger working memory) that may be less negative (e.g., possible ways of coping effectively with the negative situation or more positive bits of information that provide more reason to hope for a less negative outcome).

Evidence of memory impairments in depression was provided by recent research that compared functional magnetic resonance imaging (fMRI) studies of adults with and without current or remitted depres-

sion (Young et al. 2016). Findings showed that both those currently depressed and those who were depressed but whose depression had remitted demonstrated less activation of the amygdala and related circuits when recalling positive memories from their life and greater brain activation when recalling negative autobiographical memories. Their brain activity was significantly biased for recall of negative experiences of the past. The recall bias problem demonstrated in these patients with depression but not ADHD is likely to be even stronger in those with ADHD who experience depression or have experienced depression, given the weakness of working memory usually found in those with ADHD.

Another perspective on the linkages between depression and ADHD is provided by data from genetic studies. A major study of genetic linkages between psychiatric disorders found significant moderate correlation between ADHD and major depressive disorder based on genome-wide single-nucleotide polymorphism data (Lee et al. 2013).

Bipolar Disorders

How Is ADHD Related to Bipolar Disorders?

For many years, the diagnosis of bipolar disorder was classified with depressive disorders as though they were all just variations of the same processes. More recent research has highlighted differences that make it important to conceptualize depression and bipolar disorder as two separate categories of significant problems with mood. Although incidence rates of bipolar disorder in the general population are quite low, about 3.9% in adults (Kessler et al. 2005), those with this disorder have extremely high rates of substance use disorders and premature death due to suicide and associated medical conditions, as well as substantial role impairments, e.g., ability to work, and elevated rates of hospitalization. When the full spectrum of bipolar syndromes, including subthreshold cases, is considered, incidence in the general population increases to almost 6% (Merikangas et al. 2007).

Reported rates of bipolar disorder among adults diagnosed with ADHD are about 17% (Millstein et al. 1997). Among children with ADHD, estimated incidence of bipolar disorder ranges from 2.4% to 21%; the wide differences in those rates depend on whether or not researchers required that bipolar symptoms occurred in episodes, as stipulated by DSM-IV (American Psychiatric Association 1994). Including those who tend to have consistently irritable mood without episodes of nonagitated, euthymic mood inflates the estimated incidence of bipolar

disorder. DSM-5 introduced the new diagnostic category disruptive mood regulation disorder to describe individuals with more consistent, nonepisodic mood problems, but in DSM-5, this new type of mood problem is classified with depressive disorders rather than with other mood disorders.

There are two main types of bipolar disorder. Bipolar I disorder is characterized by one or more episodes in which the person's mood suddenly switches from being normal or depressed to a manic episode: persistently feeling and acting abnormally elevated, expansive, or irritable most of the day, almost every day, for at least 1 week. Often, patients with bipolar I disorder require at least brief psychiatric hospitalization.

Elevated mood may involve markedly heightened energy and feeling high, with exaggerated enthusiasm for interpersonal interactions (e.g., calling old friends in the middle of the night to rekindle friendship, attempting inappropriate sexual encounters). Expansive mood often involves grandiose plans or unrealistic claims of having extraordinary importance, abilities, or powers. These high moods may suddenly shift to unusually intense anger or irritable actions that are verbally or physically aggressive; often, these occur in response to situations in which the individual's wishes are challenged or frustrated.

Typically, persons in a manic state feel little need for sleep and may work, party, or engage in multiple new projects throughout the day and night, not wanting to take time to sleep. They may continually be physically restless, unable to sit still. Their speech may flow much more rapidly than usual, while their thoughts and conversation repeatedly jump from one focus to another in ways that may be difficult to follow. During a manic period, persons who are usually thoughtful and quite reasonable may plan or begin to act in ways that show impaired judgment and are likely to cause them to suffer painful consequences (e.g., purchasing many items they do not need and cannot afford, suddenly quitting a job or ending a relationship in ways that may be very costly to them and subsequently cause much regret). Often, during a manic episode, the person does not recognize that he or she is mentally ill. The risk of suicide in persons with bipolar I disorder is 15 times greater than in the general population (American Psychiatric Association 2013).

Bipolar II disorder is a diagnosis used to describe persons who have suffered one or more episodes of hypomania and at least one major depressive episode, which may occur shortly before or soon after the hypomanic episode. Manic symptoms in hypomania are quite similar to those of mania in bipolar I disorder, but they tend to be more short-lived and more impulsive and do not generally require psychiatric hospitalization.

How Are Executive Function Impairments Related to Bipolar Disorders?

The most obvious way in which bipolar disorder reflects executive function impairment is heightened difficulty in managing emotions (Pataki and Carlson 2013). Often, manic episodes are characterized by marked intensification of irritability, anger, or exaggerated enthusiasm at levels quite uncharacteristic of the individual's usual pattern of behavior: emotional expressions without adequate self-control.

Overlap between ADHD and bipolar disorder also involves two additional clusters of executive functions often impaired in persons with ADHD: 1) ability to monitor and self-regulate action and 2) ability to self-regulate levels of arousal and processing speed. During episodes of mania, the person often gets caught up in intense, driven behaviors not modulated by the usual levels of self-control. This may involve incessant rapid speech, inability to relax or sit still, or determination to proceed with actions that are impulsive and ill-considered. In addition, manic episodes often include loss of ability to regulate sleep and alertness; usual patterns of sleep are lost, and often the person feels no need to sleep for several days until the manic episode abates, at which time the person may collapse into lengthy episodes of long-overdue sleep.

Oppositional Defiant Disorder and Conduct Disorder

How Is ADHD Related to Oppositional Defiant and Conduct Disorders?

Oppositional defiant disorder (ODD) and conduct disorder (CD) have long been seen as closely related to the combined (more hyperactive) type of ADHD. *Oppositional defiant disorder* is defined in DSM-5 as a recurrent pattern of angry/irritable mood, argumentative/defiant behavior, and/or vindictiveness that is significantly more extreme than usual patterns in the age group, tends to occur at least once a week, and lasts at least 6 months. In the general population of the United States, ODD has been found to occur in about 10%–12% of children (Merikangas et al. 2010; Nock et al. 2007). Among children with ADHD, the estimated prevalence of ODD ranges from about 15% to 50%, with the higher prevalence among those with the combined type of ADHD (Connor et al. 2010).

ODD usually has onset at about age 12 years, but this pattern of severe, chronic oppositionality and irritability sometimes appears earlier,

even in preschoolers who greatly exceed the range of such behavior seen in most of their peers (Burke et al. 2010). Usually, this pattern persists for about 6 years and gradually remits. Most children and adolescents diagnosed with ODD (70%) do not develop CD, a much more severe pattern of behavior problems. However, over the longer term, some with ODD suffer from elevated rates of school suspensions, and some develop major depressive disorders (Biederman et al. 2008).

Conduct disorder is defined in DSM-5 as “a repetitive and persistent pattern of behavior in which the basic rights of others or major age-appropriate societal norms or rules are violated” (American Psychiatric Association 2013, p. 469). These violations may involve threatening or causing physical harm to persons or animals; aggressive behavior that causes loss or damage to property; deceitfulness or theft; and serious violations of parental, school, or workplace rules. DSM-5 reports prevalence estimates of CD range from about 2% to more than 10% of the general population, with a median of about 4%. Often, those who develop CD have previously had ADHD, but less than 30% of those with ADHD and ODD develop symptoms of CD sufficient to warrant diagnosis.

How Are Executive Function Impairments Related to Oppositional Defiant and Conduct Disorders?

At first glance, ODD might be considered simply another example of the executive function not modulating emotions, similar to anxiety and depressive disorders. However, both ODD and CD also involve problems in modulation of both emotional expression and inhibition of some types of passive or overt aggressive behavior.

ODD usually includes recurrent patterns of failure to inhibit actions, such as defiant verbal outbursts and overt actions, or failure to act. This causes considerable trouble for individuals with ODD and for their parents, teachers, and other caretakers. In those with CD, defiance of authorities and social expectations may be less weighted with emotions, more cold and emotionless, but the actions of individuals with CD are much more severe than the actions of those with ODD and are likely to carry heavier penalties; the failures of inhibition of action are more destructive and may be more dangerous to self and others. Another important characteristic of individuals with ODD or CD is that they tend to be quite impulsive in their actions. Often, they do not hesitate long enough to consider the longer-term impact of swearing at their teacher, shouting rudely at their boss, shoplifting an article they want in a store,

or driving a car at excessive speed. Their working memory does not bring up in the moment adequate anticipation and planning for potential consequences; they do not ask themselves, “What is likely to happen if I do this?”—they just do it. This is another example of the problem mentioned in Chapter 5, “How ADHD Impacts ‘Brain Googling’ for Motivations”: persons with ADHD often get so focused on their immediate situation that they lose sight of the larger context, much as someone observing a basketball game through a telescope may get a good look at a very limited aspect of the action while not being able to see opportunities or threats in the actions on the rest of the court. Keeping the context and possible consequences in mind is an important aspect of the executive function cluster of monitoring and self-regulating action.

Obsessive-Compulsive and Related Disorders

How Is ADHD Related to Obsessive-Compulsive and Related Disorders?

Obsessive-compulsive and related disorders are a grouping of disorders that involve either or both of two aspects: 1) recurrent thoughts, images, or urges that persist, even though the individual wishes to avoid or forget them, and 2) repetitive behaviors or mental actions that the person feels driven to do and that result in anxiety if the behavior is not done, even though the person may recognize that these actions do not make much sense or provide much realistic benefit.

Prevalence of obsessive-compulsive disorder is reported to be about 2%–4% in the general population of children and adolescents; prevalence in adults is about 1.5%–3% in the general population. Among children and adolescents diagnosed with ADHD, the incidence ranges from 6% to 33% (Geller and Brown 2009; Storch et al. 2008). There is great variety in the way obsessive-compulsive and related disorders present; a few examples are provided below.

Case Example: A religious child who refuses to attend church

A very religious 15-year-old boy willingly attended church with his very religious parents every Sunday. Over several weeks, he became increasingly reluctant to go to church; on the fourth consecutive Sunday, he completely refused to go to church and cried inconsolably, claiming he wanted to go but did not know why he could not. He said he just could

not do it and probably never would ever attend church again. In psychotherapy, he disclosed that about 6 weeks earlier, while in church, he had the thought “What would happen if I stood up during this quiet prayer time and said ‘Fuck you!’ out loud?” He thought of how embarrassing it would be for him and his parents. He told himself that he would never actually do such a thing, but he kept thinking about it every day and could not get it out of his mind. Every Sunday for the next month he struggled in church, terrified that he would suddenly lose control, get up and do it. Finally, to avoid the risk, he stubbornly refused to go to church, although he felt unable to explain his reason to his parents.

This boy’s sudden refusal to attend church services was the result of his being terrified of his unacceptable urge to embarrass himself in a public place. He was puzzled and frightened by this persisting thought, terrified that he might act on it. Gradually, in psychotherapy it became clear that this was related to his feeling increasing guilty about masturbating to erotic fantasies.

Case Example: A young mother who fears hurting her baby

A 31-year-old mother felt overwhelmed and a bit resentful about the hard work of caring for her first infant. She became preoccupied for months with the persistent thought that she might accidentally put a poisonous substance in her infant’s bottle; she became unable to get out of her head the image of her baby dying in her arms as a result of her carelessness.

Case Example: A woman distressed about her husband’s safety

A 26-year-old woman, recently married, worried excessively when her husband did not return by exactly the time she expected him. If he did not arrive by that time, she felt compelled to stand by the window to watch for him as she imagined various reasons he might be late. As the minutes ticked by, she was able to stay relatively calm as long as she kept staring out the window awaiting his arrival. If she walked away from the window, even briefly, her mind filled with images of her husband having been injured in a motor vehicle accident, being taken to the hospital in an ambulance, dying, and lying in a casket. For her, standing by the window to await him was her only protection from being overwhelmed by morbid thoughts.

Case Example: A driver who fears injuring a pedestrian

A 42-year-old man worried that while driving, he might accidentally run over a pedestrian waiting to cross the street and not even notice that it had happened. Each time he drove through an intersection where pe-

destrians were waiting at the curbside to cross, he had to check his rear-view mirror to make certain that there was no pedestrian lying injured in the crosswalk. If he could not see that all were safe, he felt compelled to drive around the block and drive once again through that intersection to verify that he had not injured anyone.

Another way in which obsessive-compulsive disorder commonly manifests is excessive perfectionism that extends far beyond any reasonable assessment of what constitutes doing a good job on a task. Some patients report that when taking notes in a class or a meeting, if they accidentally write outside page margins or misspell a word, they cannot simply erase or cross out the mistake; they feel a strong urge to discard the entire page and attempt to completely rewrite what they had on the page so it will appear perfect.

Others have similar difficulties when they are writing an e-mail, a report, an essay, or a term paper. They are unable to write a first draft, review it to correct errors, and then send it on. They feel an irresistible pressure within themselves to get the first sentence written so it will sound “just right” before they can allow themselves to write the second sentence. They then need to write and rewrite that second sentence until it sounds just right to them; they cannot begin the third sentence until the second sentence has been perfected. They try to follow the same procedure through to the completion of the paper and continue to rewrite each sentence until it meets that requirement of perfection. This very slow and tedious way of attempting sequential perfectionism in writing proceeds from sentence to sentence, greatly delaying completion of the task and often preventing the task from being completed at all. For some, this excessive perfectionism is limited specifically to tasks of written expression. For others, such rigidity is just one of many manifestations of an obsessive-compulsive personality disorder.

These examples illustrate just a few of the wide variety of ways in which obsessive-compulsive disorder can impair the functioning of children and/or adults. Related disorders include *body dysmorphic disorder*, the inordinate preoccupation with perceived defects or flaws in one’s physical appearance not observable to others; *hoarding disorder*, the excessive and persistent impulse of an individual to save various objects and to become very distressed at the prospect of losing even objects that are totally useless and of no apparent value, even when these objects clutter living space so much that it cannot be adequately used; compulsive pulling out of individual hairs (*trichotillomania*); and picking compulsively at one’s skin with such persistence that it results in chronic bald patches or sores (*excoriation disorder*).

How Are Executive Function Impairments Related to Obsessive-Compulsive and Related Disorders?

One executive function impairment that characterizes many types of obsessive-compulsive disorder is chronic difficulty in inhibiting one action or behavior to shift to another (Chamberlain et al. 2005). Affected persons have difficulty shifting between microfocus on one specific concern or aspect of a task or situation to a broader, more macro view. This makes it difficult for them to realistically recognize how that one specific task or situation fits into the larger context of that task and other goals or concerns.

The boy who felt he had to avoid attending church focused so intently on his fear of impulsively shouting out during the church service that he lost sight of how that fear of embarrassing himself and his family would protect him from taking that action. He feared that the thought would force the deed, losing sight of the difference between thinking and doing. He concentrated on the fear while distracting himself from his irrational guilt over the masturbatory behavior in which he continued to engage.

Likewise, the young mother focused so intently on her fear of poisoning her child that she distracted herself from her quite understandable wish to be less weighted down by her increased burdens of caring for him. She lost the distinction between wishing and doing as she struggled to preserve her picture of herself as being totally happy about being a mother, ignoring the reality of the accompanying frustrations. She was not able to shift her attention to see the broader picture—a weary new mother who loved her child but also felt some resentment for the associated new responsibilities.

This same impairment of ability to shift focus, to inhibit and stop one activity to focus instead on another, is involved for those who are caught up in excessive perfectionism in their writing. They become so focused on their wish to do a very good job that they lose sight of how doing a good job fits into the larger context of completing the task in a timely manner to meet a deadline and to reserve ample time for other required tasks. Difficulty in shifting focus and inhibiting one action to engage in another is connected to another executive function: prioritizing. Determining which of multiple tasks to do first, second, and third requires shifting focus from a single task to a broader view that looks at the larger context of tasks and demands, weighing one against the other in terms of both immediate and longer-term goals. Similar problems in shifting focus and prioritizing characterize hoarding difficulties; the individual is unable to keep the broader context in

mind and loses the ability to prioritize which objects are worth keeping and which ones need to be released or discarded.

Substance Use Disorders

How Is ADHD Related to Substance Use Disorders?

Substance use disorders differ from other disorders often accompanying ADHD because of the role of the substance and context of using it in sustaining the disorder. Unlike other disorders such as anxiety disorders, depression, bipolar disorder, and obsessive-compulsive disorder, substance use disorders are shaped primarily by the actions of a chemical substance introduced into the body deliberately to modify mood, thought patterns, or social interactions. Usually, getting access to and using these chemical agents also involves the individual in a social context that can have a significant negative effect on motivations, patterns of behavior, and self-understanding. Interacting with the persons who provide the substance and with others who use it can have a powerful impact on the individual's view of self and patterns of interacting with family, friends, and classmates or coworkers.

Substance use disorders involve patterns of addiction. Drug addiction is a disorder, often, but not always, with chronic relapses, characterized by 1) compulsion to seek and take the drug, 2) loss of control in limiting intake, and 3) emergence of a negative emotional state (e.g., depressed mood, anxiety, irritability) that reflects a motivational withdrawal syndrome when access to the drug is not available. Addicts do not repeatedly seek to use the drug of abuse to gain pleasure; they urgently seek it to reduce their stress and pain.

Repeated episodes of excessive use of illicit drugs cause the brain's reward system to gradually undergo physical changes that modify how the brain reacts to such drugs. A landmark study reported that imaging studies have provided evidence that these changes involve "reprogramming of neuronal circuits that process (1) reward and motivation; (2) memory, conditioning, and habituation; (3) executive function and inhibitory control; (4) interoception and self-awareness; and (5) stress reactivity" (Koob and Volkow 2010, pp. 225–226).

There is a lot of evidence that individuals with ADHD have a greater risk of developing a substance use disorder at some point in life than do persons without ADHD. This may be related to a common genetic network that underlies both substance use disorders and ADHD (Arcos-Burgos et al. 2012). Table 7–3 contains data from a meta-analysis of 27 studies in-

volving more than 4,000 persons with ADHD and 6,000 persons without ADHD assessed at an average age of 18.9 years. Numbers shown represent pooled odds ratios in which 1.0 indicates no difference from the non-ADHD sample and 2.0 indicates twice the likelihood of the non-ADHD sample (Lee et al. 2011).

These data from multiple studies indicate that overall substance use disorder is more than two and a half times as frequent among young adults with ADHD than in the general population of similar age (Lee et al. 2011). The negative impact of substance use disorders combined with ADHD is substantial, particularly their impact on education. A massive study of 29,000 adults in the United States found that failure to graduate from high school by the usual age of 18 years was significantly more common among persons with ADHD in combination with a substance use disorder than among persons with any other psychiatric disorder combined with substance use disorder (Breslau et al. 2011). Often substance use disorders become sufficiently impairing that the individual seeks treatment. A meta-analysis of 29 studies found that one out of every four patients seeking treatment for substance use disorder also had ADHD (van Emmerik-van Oortmerssen et al. 2012).

How Are Executive Function Impairments Related to Substance Use Disorders?

The most important effect of executive function impairments on substance use disorders appears to be through the impact of these impairments on the individual's ability to function successfully in schooling. Data from the large study of high school graduation rates mentioned in the previous subsection indicated that

attention problems assessed at the time of school entry are associated with lower academic achievement, as measured by standardized tests, at the end of primary school...and at the end of high school.... This increased burden in students with ADHD to perform the tasks that underlie academic performance (i.e. working memory, processing speed, organization of information) may have cumulative negative effects. (Breslau et al. 2011, p. 299)

The point here is that when students who demonstrate significant problems with attention (i.e., problems with executive functioning) start school, they tend, as a group, to do relatively poorly from their earliest school years through primary school and high school and tend to be slower to complete high school or may not graduate from high school at all. Breslau et al. (2011) also provided evidence that such school difficulties appear to be related to impairments of executive functions.

TABLE 7–3. Likelihood of substance use disorder in persons with attention-deficit/hyperactivity disorder (ADHD) versus persons without ADHD

	Odds ratio
Nicotine	2.82
Alcohol	1.7
Marijuana	2.29
Cocaine	2.05
Overall substance use disorder	2.64

Note. Odds ratio of 1.0 indicates no difference between persons with ADHD and persons without ADHD; odds ratio of 2.0 indicates that persons with ADHD have twice the likelihood of use.

Source. Data from Lee et al. 2011.

This route from executive function impairments of ADHD to school problems to substance use disorder was demonstrated in findings of additional research that prospectively studied children with ADHD and a comparison sample from ages 13–18 years (Molina and Pelham 2003). Data from that study showed that inattention symptoms of ADHD were better predictors of later substance use disorders than were childhood antisocial behaviors such as CD. Results from that study showed that ADHD in childhood is as strong a predictor of substance abuse as having a positive family history of substance use disorder. The researchers argued that

inattention may influence substance abuse through mediational variables such as poor academic achievement and peer difficulties....[W]hat may follow is gravitation away from conventional group values and behaviors that include academic success, and gravitation toward nonconformist peer groups where substance use is tolerated and modeled. (Molina and Pelham 2003, p. 504)

Clinical experience supports this view that social context often plays an important role in substance use disorders. Individuals who use drugs of abuse excessively often withdraw from their previous social relationships and tend to spend more time with others with whom they can join comfortably in more excessive drug use. This can provide companionship with others less likely to be judgmental of their drug use; it may also provide connections where they can more easily procure drugs not legally available to them.

For individuals, especially adolescents or young adults, trying to recover from excessive drug use, it can be very difficult to change their social context. Those who have developed a reputation as a “heavy stoner” or “druggie” may not be welcome to return to a former friendship group. It may be very difficult for them to gain access to friends who are not actively using drugs of abuse.

Sustaining recovery from drug abuse is extremely difficult if the recovering addicts return to the social context in which they were previously using, especially if former friends in that setting are still actively using drugs. There is strong evidence that when individuals who have been addicted to a substance return to the context in which they previously practiced their addiction, even after a long period of abstinence, multiple cues intensify brain activity that produces intensified craving and a strong push toward seeking and resuming use of the habitual drug (Crombag et al. 2010).

Another point of linkage between ADHD and substance use disorders has been identified by genetic studies. Results from the National Human Genome Study included evidence that a common genetic network underlies substance use disorders and ADHD as well as ODD and CD (Arcos-Burgos et al. 2012). Many of these genes are associated with the development and guidance of the development of neural pathways and regulation of synaptic transmission, among other functions.

Autism Spectrum Disorder

How Is ADHD Related to Asperger’s Disorder and Autism Spectrum Disorder?

Over recent years, many studies have identified significant similarities between ADHD and autism spectrum disorder (ASD) (Grzadzinski et al. 2011; Martin et al. 2014; van der Meer et al. 2012). Grzadzinski and colleagues (2011) evaluated parent ratings of 75 children ages 7–17 years diagnosed with ADHD and found that 24 of them had elevated scores for symptoms of ASD. The prevalence of ADHD symptoms in children diagnosed with ASD has been reported to be between 13% and 50%.

There is substantial evidence of various similarities between ADHD and ASD. Using latent class analysis with a sample of 644 children and adolescents, van der Meer et al. (2012) found five classes, including one with ADHD without ASD symptoms and several with both ADHD and ASD symptoms but no class with ASD without ADHD symptoms. Martin et al. (2014) found significant genetic overlap between 727 children

with ADHD and 996 children with ASD; a significant number of genetic variants in each group also appear in the other. Di Martino et al. (2013) used fMRI to identify overlapping functional networks in both cortical and subcortical areas of the brain in 151 children: 56 diagnosed with ASD, 45 diagnosed with ADHD, and 50 typical children; their study also identified distinctive areas of the brain that differentiated ASD from ADHD.

It is important to note that although genetic influences are related to problems with social interaction, language difficulties, and social anxiety in individuals with ASD, familial studies also identify strengths of persons with ASD. Simon Baron-Cohen (2000; Baron-Cohen et al. 1998) found that parents of children with ASD or Asperger's disorder were more likely to be engineers, physicists, or mathematicians. Ozonoff et al. (2002) observed that genetics associated with ASD brings a certain distinctive style of thinking, relating, and reacting to the world that has both limitations and strengths.

Individuals with ADHD tend to be more fully engaged in and more motivated for interactions with other persons than most individuals with ASD or Asperger's disorder, yet both share limitations that impact their social interactions in varying degrees and various contexts. Nijmeijer et al. (2008) pointed out the following:

[A]lthough children with ADHD generally do not lack interest in other people, they often fail to properly attune their behavior to other persons and to constantly changing social environments. The key characteristic of a substantial number of children with ADHD can be described as an apparent lack of a full comprehension of the consequences of their behavior to others. (p. 695)

These difficulties often persist in adults with ADHD just as they often persist in adults with ASD, but in both groups the difficulties in social interactions depend considerably on the specifics of the social situation.

How Are Executive Functions Related to Asperger's Disorder and Other Autism Spectrum Disorders?

In DSM-5, the classification of several diagnoses related to autism that were differentiated in earlier versions of the manual was changed. Most strikingly, the separate diagnosis of Asperger's disorder and several other diagnoses were removed and reclassified as aspects of the autism spectrum. The removal of Asperger's disorder as a separate diagnosis

was controversial and remains so, pending further research. Many researchers and clinicians consider having a separate diagnosis for Asperger's disorder to be more useful because of significant differences between it and other disorders classified on the autism spectrum (Volkmar et al. 2014). These differences are described briefly in Chapter 12, "Treatment Adaptations for ADHD With Various Complications."

According to DSM-5, ASD is characterized by two major impairments: 1) "persistent deficits in social communication and social interaction across multiple contexts" and 2) "restricted, repetitive patterns of behavior, interests, or activities" (American Psychiatric Association 2013, p. 50). These may occur with or without accompanying intellectual impairment and with or without accompanying language impairment; ASD is diagnosed in one of three classes depending on the level of support needed by the individual.

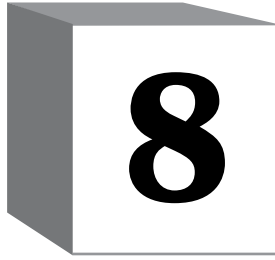
Executive functions play a central role in social-emotional functioning, just as they do in many other aspects of daily life. Social and emotional functioning depend on executive functions described in the model of ADHD presented in Chapter 2. These functions include the following:

- Capacity to focus on the immediate situation without becoming excessively distracted
- Capacity to shift focus as needed for changing dynamics of the situation
- Ability to hold in mind what is being said and done in an ongoing situation
- Capacity to inhibit excessively impulsive responses and behave appropriately
- Ability to modulate expression of emotion
- Capacity to monitor verbal and nonverbal cues revealing others' reactions

Summary

There is strong evidence that children, adolescents, and adults with ADHD tend to have other learning or psychiatric disorders at some point in their lives more often than do those without ADHD. In this chapter, I describe research on the frequency of specific learning disorders, anxiety disorders, depressive disorders, bipolar disorders, oppositional defiant and conduct disorders, obsessive-compulsive and related disorders, substance use disorders, and autism spectrum disorder.

ADHD is a foundational disorder that crosscuts many other psychiatric disorders. It is more like impairment of a computer's operating system than impairment of a computer software program. This chapter's discussion of each of these various types of co-occurrences also addresses the question of why that particular type of disorder appears so much more frequently among those with ADHD than among others in the general population. It explains what specific executive function impairments underlie and impact each specific disorder.



Assessing Children, Teenagers, and Adults for ADHD

DECADES AGO WHEN THE DISORDER NOW known as attention-deficit/hyperactivity disorder (ADHD) was thought of as essentially a behavior problem of young children, assessment was a simple task. The clinician observed and collected information about how hyperactive and impulsive the child was in school and at home. If the child's activity patterns were substantially worse than what was expected for his or her age and no other cause was apparent, the diagnosis seemed clear.

Now that this disorder is recognized as a problem in the development and functioning of the brain's management system, found not only in young children but also in adolescents and adults, the task of assessment is more complex. The clinician needs to understand the multiple, often subtle, ways in which ADHD can impact a person's cognitive, emotional, and behavioral functioning in school, family life, employment, and social interactions at various ages.

Some clinicians believe that executive functions impaired with ADHD can be measured with a battery of neuropsychological tests, such as the Wisconsin Card Sorting Test and the Rey-Osterrieth Complex Figure test, which are referred to as "tests of executive function." Despite the name of this group of tests, they are not adequate measures

of executive functions impaired by ADHD. When such a test battery is used to assess persons with ADHD, only about 30% of those with ADHD are found to have impaired executive functions. Barkley (1997, 2006, 2011) and Brown (2000, 2006, 2013) have both argued that *all* of those with ADHD experience executive function impairments and that this impairment can be effectively demonstrated in data from clinical interviews and normed rating scales but not by neuropsychological tests of executive function.

No Single Test for ADHD

There is no single test that provides an adequate assessment for the presence or absence of ADHD. No electroencephalogram, neuropsychological test, or computerized measures can capture the variety and complexity of functions involved in getting up in the morning and preparing to leave for school or work, riding a bike or driving a car in traffic, reading and comprehending papers or books, participating in social conversations, and prioritizing a variety of tasks and getting started on what is most important while avoiding distractions yet shifting focus when needed. Assessment for ADHD requires collection of information about how the person functions in a wide variety of complex daily tasks at many different times of day in many different settings.

Although, at present, no diagnostic imaging tests are adequate for confirming or rejecting a diagnosis of ADHD, imaging studies such as positron emission tomography and functional magnetic resonance imaging provide helpful research data showing brain characteristics in groups of persons already diagnosed with ADHD, but these momentary snapshots of brain structures and function cannot determine whether any given person has or does not have the disorder. ADHD is not like a fracture or a tumor where imaging techniques can locate and identify pathological changes or damage in tissues. ADHD is a functional problem that involves impairments in rapid-fire communications that occur in milliseconds within and between brain regions and between vast networks of infinitesimal neurons.

Similarly, although ADHD involves problems with neurotransmitter chemicals produced in the brain, there is no blood test that can adequately assess those difficulties because the problems do not occur in persisting levels of those chemicals in the bloodstream or cerebral spinal fluid. The difficulties occur at countless junctions between infinitesimal individual neurons where the transmitter chemicals are released and reloaded within milliseconds.

Clinical Assessment for ADHD

At present, the most effective way to determine whether a person may have ADHD is a well-conducted clinical interview with the patient (and, if possible, one or two people who know the patient well) by a clinician who is familiar with ADHD and with other medical or psychological disorders that might produce similar symptoms in a person of comparable age. For the clinician to adequately determine whether an individual has ADHD and/or another disorder, the following objectives should be addressed:

- To learn what problems have brought the patient to seek consultation at this particular time, how long the problems have existed, and how much they are interfering with the patient's daily life
- To obtain information about the patient's cognitive abilities, adaptive strengths, and activities as well as aspirations, stressors, and motivations for personal change
- To understand the emotional and social contexts (e.g., school, work, family life, friendships) in which these problems occur and do not occur in the present and in earlier years
- To gather information about blood relatives in the patient's immediate and extended family who may be experiencing or who may have experienced problems with attention, learning, mood, anxiety, getting along with people, and/or substance use, which may be useful for considering possible genetic factors that may be contributory
- To identify current or past difficulties with development, physical health, or medical treatments that may be affecting the patient's current difficulties or response to treatment
- To ascertain whether the patient, currently or in the past, has had involvement with problematic excessive use or abuse of alcohol, marijuana, or other drugs that may impact current functioning
- To learn about the patient's patterns of sleep: falling asleep, staying asleep, and awakening, as well as maintaining adequate alertness during the day
- To get a description of the patient's current patterns of growth, appetite, eating and nutrition, and/or difficulties in managing these
- To identify any current or previous assessments or treatments, psychological and/or medical, that the patient has utilized and how the treatments have worked for him or her
- To gather information about any additional learning or psychiatric problem that may be causing or complicating the patient's ADHD symptoms

- To inquire about the patient's current temperament and moods (e.g., depression, anxiety, pleasure)
- To educate the patient about current scientific understandings of ADHD—its symptoms, its causes, the variety of presentations, and possible treatment interventions

I have found that I need at least 2 consecutive hours to conduct such an evaluation so there is ample opportunity to build rapport and gather information without interruption.

Usually, it is helpful to conduct most of the initial interview jointly with the patient and one or both parents or a partner or friend who accompanies the patient as a collateral. This allows multiple inputs for more adequate information gathering; it also provides the patient with another person who can hear and contribute to the discussion, as well as helping the patient to recall later what was discussed. However, it is also important for the clinician to spend some time alone with the patient so he or she can bring up questions, facts, or concerns that may be uncomfortable for the patient to discuss in the joint setting. If an adult is unwilling or unable to bring a collateral to the interview, I will see him or her alone.

Some clinicians ask the patient and/or collaterals to come to the initial interview having filled out rating scales used for assessment of ADHD. I prefer to administer rating scales orally during the interview so that I have the opportunity to see how the patient and collaterals have understood the questions being asked, to pose follow-up questions, and to observe where they may have different opinions about how to answer. This also allows me to clarify if the individual does not seem to understand the question or is unclear about how best to respond.

Elements of the Clinical Interview

The following list of 13 topics and relevant questions is intended for situations where the patient is old enough to participate in answering questions and providing information. Suggestions for modifying the format when the patient is a younger child are given in the section "Modifications of Assessment for Younger Children." For most of these questions, it is preferable to have the patient respond first, asking collaterals (i.e., parent, spouse, partner, or friend) to offer their responses after the patient has answered.

1. **Identification of the problem.** Establish the following: How did the patient and/or parents decide to come for evaluation at this time? What are they hoping to accomplish in this session? Are there differences in what the patient and collaterals are hoping for from the session?

2. **Current school or work situation.** Inquire: What is a typical week-day/weekend day?

If patient is a student: Ascertain school and grade level. Inquire about what specific classes or courses are being taken, current grades in each, what class the student likes most, and which is disliked or is more of a struggle. Is liking or dislike due mainly to the subject, to the teacher, or both? Is this better or worse than the previous year? If grades are low, is this due more to low test grades or to failures in getting assignments completed on time? How are relationships with teachers and other students? How much time outside of class is spent on homework most days? How much of that time is productive work time? How much of it is “circling the airport”? Does anyone in the family or any tutor assist with homework?

Is there any part-time job outside of school? What do you think you would like to do for a career after you finish school?

If patient is out of school: Ask about current employment—responsibilities, duration of employment in current position, feedback from supervisors, and relationships with supervisors and coworkers. What is liked and/or disliked about the current job? What jobs have previously been held? How did those end? If currently unemployed, how long out of work? Currently looking for work? What type of position is being sought? Expectations?

What schooling has been completed? Where and when? What subjects were especially easy or especially difficult in previous schooling? Grade point average? Scores on any standardized tests taken (e.g., SAT, ACT, GRE, GMAT, LSAT, MCAT)?

3. **Activities for fun.** Inquire about sports, hobbies, clubs, lessons, games, and family activities. Does the patient interact (outside of school or job) with one or two friends regularly or a large group of friends? Or does he or she spend a lot of free time by himself or herself? What activities are most enjoyed? Any special skills or talents in past or present?
4. **Self-image.** Assure the patient that you are not actually going to do this but ask hypothetically, “If I were talking with some friends who know you well and I asked them to describe you, what do you think they would say?” If the patient does not offer responses quickly, prompt with queries such as the following: Would they say you are quite friendly and outgoing or more quiet and shy? Good sense of humor or fairly serious most of the time? Someone who usually keeps the rules or someone who pushes the envelope or gets in trouble a lot? Someone with a long fuse (it takes a lot to get you angry) or a short fuse (you get mad quickly and often)? More of a leader, more

of a follower, or more off on your own? Someone who is super smart, sort of smart, or not so smart compared with others your age?

5. **Current living arrangements.** Verify the following: Where do you live and who lives with you? Get names and ages of each person in the immediate family or living unit and what they currently do (e.g., grade in school, job). Then ask the patient to say three words to describe each one, for example, things they like to do, what kind of personality they have, or how they are with you. Is there anyone else who is very important to you and whom you see a lot, even if they don't live with you?
6. **Family of origin.** If the patient is not living with his or her family of origin, ask, Who was in your family when you were growing up? Names and ages of parents and siblings? Where is each one now? Please say three words to describe each one. What schooling did each have, and what kind of work do they or did they do?
7. **Family stress.** Explore any family strains or tensions. Are there any special stresses that have affected you or your family over the past few years? Moving to a different house, job-related problems, marital problems, economic pressures? Is anybody seriously sick? Has anyone died recently?
8. **Family psychiatric history.** Explain that you are interested in and have some questions about not only immediate family but also extended family: grandparents, uncles, aunts, cousins—anybody, living or dead, who is related through blood.
 - Anybody with a lot of difficulty paying attention or learning certain things, perhaps good in reading but not in math or vice versa? Anybody who seems/seemed fairly smart but did a lot better once he or she got out of school than when he or she was in school?
 - Anybody with a lot of difficulties with his or her moods, getting seriously depressed or very hyper or very irritable?
 - Anybody considered a big-time worrier or perfectionist or subject to panic attacks?
 - Anybody with a lot of trouble understanding or getting along with other people?
 - Anybody with serious problems with drugs or alcohol?

For any with such problems, try to find out which side of the family, whether the problem was actually diagnosed or was just suspected. Ask how those family members turned out or are now. The purpose of these inquiries is to get some indication of what problems might be in the patient's genetic background.
9. **Health.** Confirm the patient's health status. How is your health generally? Do you get sick much? Any bad allergies? Any problems with

your vision or hearing? Do you wear glasses or contact lenses? Do you take any medications regularly for anything? If so, what medicines and for what problems and for how long? Have you taken other medicines regularly in the past that you don't take any longer? If so, what, when, and any problems with those medicines? Have you ever been in the hospital overnight? If so, for what, when, and for how long? How is your blood pressure? Have you ever had a concussion or other head injury? Loss of consciousness? If so, when and what happened? Have you ever had a seizure? Has your doctor told you that you have thyroid or any other medical problems?

Were there any problems during the pregnancy, your delivery, or your early infancy? Any problems with colic, difficulty being comforted, or chronic ear infections? What was your level of activity as a toddler—high, average, or low? Any delays or problems in learning to crawl, walk, or talk? Any problems with clumsiness or coordination? Any difficulties with speech, language, or basic math or reading skills?

10. **Substance use/abuse.** (Note: Do not ask adolescents or young adults these questions while their parents are in the room. Instead, ask the parents whether they have any reason to suspect that their son or daughter has a problem with smoking cigarettes, drinking alcohol, or using marijuana or any other drugs. In a private session with the adolescent or young adult, reassure him or her that you will not share with anyone else what he or she tells you, then ask the following questions directly as you would an adult. If the patient uses general terms like “not very much” or “only once in a while,” ask him or her to be more specific, for example, “How many times a day or in a typical week?” Also, ask how the use of any of these substances affects him or her and whether he or she has had periods when his or her use was more excessive or problematic.)
 - How much beer, wine, or liquor do you drink? How often? Earlier use?
 - How much do you smoke cigarettes? How often? Earlier use?
 - How much marijuana do you smoke/vape/dab/eat? How often? Earlier use?
 - Do you use any street drugs (e.g., coke, heroin, ecstasy, oxy-Contin)? Which ones? How many days per week? How much do you use at a time? Earlier use? (Try to get specific.) Do you use any drugs not prescribed for you?
11. **Sleep and alertness.** Explore the patient's sleep patterns. What time do you usually get into bed on nights when you have school or work the next day? If you get into bed at that time and say to yourself, “OK,

now I want to go to sleep,” how long does it usually take for you to actually fall asleep? How many nights in a typical week does it take you more than half an hour to get to sleep? Once you fall asleep, do you sleep through the night, or do you get up to use the bathroom or get a drink? If you wake up during the night, how long does it usually take you to get back to sleep? How difficult is it for you to get up and out of bed in the morning when you must go to school or work? Can you get up by yourself with just an alarm clock, or do you need another person to wake you up? Do you snore when you sleep? If you do snore, do you sometimes hold your breath while you’re sleeping, so someone nearby might think you’ve stopped breathing? How often are you late to work or school when it is your fault? If you are late, how late are you? During the daytime, do you find that you get drowsy and have a hard time keeping yourself awake? Do you take naps? If so, how often and usually for how long?

12. **Appetite and physical development.** Ask about the patient’s physical development and concerns. How is your appetite? Are you a big eater or not such a big eater? How much do you weigh? Has your weight been stable over the past year or has it gone up or down a lot? Are you satisfied with your current weight or do you think a lot about how you would like to weigh less or more? How tall are you? (For a child or adolescent, pose the following questions: How big are you compared with most other kids your age? When was your fastest growing time over the past few years? For a female of appropriate age, inquire about the following: Are your menstrual periods regular? Any significant changes in your periods over the past year? Do you tend to have a lot of moodiness or discomfort during or a few days before your period?)
13. **Current moods.** Explore the patient’s state of mind. What has been your mood most of the time in recent months? Do you think you feel sad or unhappy any more than most others your age? Do you think you worry any more than most others your age? Do you think you have any more trouble getting along with others than most others your age? Do you think you get frustrated or irritable or lose your temper any more than most others your age?

Screening for Possible Co-occurring Disorders

Throughout the clinical interview, the clinician should be alert to any comments from the patient or collaterals that suggest symptoms of a disorder in addition to ADHD. If there is an indication that the patient has

significant difficulties that might suggest another disorder, make some inquiries to obtain a clearer picture of how and when those problems are noticed, for example, “You mentioned that you tend to be very moody. Could you tell me a bit about how your moods shift and what seems to cause the shifts?” or “You mentioned that you often tend to check repeatedly to be sure you have everything before you leave the house. Are there any other routines you need to follow—counting things, arranging things, repeating things—that don’t make a lot of sense even to you, but you feel you have to do them or you don’t feel right?”

It is not only possible for children and adults with ADHD to have another learning or psychiatric disorder in addition to ADHD, it is much more likely than for most others who do not have ADHD. Learning disorders and the most common psychiatric disorders found among children and adolescents with ADHD are shown in Table 7–1 (Chapter 7, “How and Why Other Disorders Often Co-occur With ADHD”). The percentages of more than 61,000 children and adolescents 6–17 years old with or without ADHD who were found in this large research study to also have a specific disorder are indicated.

Often the child or adolescent with ADHD has more than one additional disorder. One-third of the children in that study who had ADHD had at least one comorbid disorder, 16% had two, and 18% had three or more additional disorders (Larson et al. 2011).

According to the National Comorbidity Survey Replication study, adults with ADHD are more than 6 times more likely than those without ADHD to have at least one additional psychiatric disorder at some point in their lifetime. They are 5 times more likely to have depression or some other mood disorder, 3.7 times more likely to have one or more anxiety disorders, 3 times more likely to have a substance use disorder, and 3.7 times more likely to have disruptive, impulse-control, or conduct disorders, such as oppositional defiant disorder or intermittent explosive disorder; bulimia; or gambling problems (Kessler et al. 2006).

It should be noted, however, that Larson et al. (2011) and Kessler et al. (2006) are not reporting that the children or adults with ADHD had these problems continuously throughout their lifetime. Instead, these high numbers reflect how many individuals had one or more of these additional disorders at some time in the lifetime. If there is an indication that patients being assessed have had symptoms of one or more additional disorders, it is important for the clinician to ascertain whether the problems were very recent and still affect the patient, whether the problems are in the past and have no current effect, or whether problems are ongoing or possibly recurrent. Information about how treatment for ADHD may need to be modified for patients also experiencing a concurrent disorder or with a history of a

significant disorder is included in Chapter 12 (“Treatment Adaptations for ADHD With Various Complications”).

Administration of ADHD Rating Scales

After obtaining a careful history, I administer a normed rating scale for ADHD appropriate for the age of the patient. Among the possible choices are the Barkley Rating Scales (Barkley 2011, 2012a), the Brown ADD Rating Scales (Brown 1996, 2001), the Brown Executive Function/Attention Rating Scales (Brown, in press), and the Conners ADHD Rating Scales (Conners 2008a; Conners et al. 1999), all of which are available in versions normed for age groups across the life span. First, I hand out 3-inch×8-inch cards on which are written the patient’s possible response numbers; each card has one to three words defining what the number means. For the Brown scales, the objective of the card system is to determine not only how often a problem occurs but also how much trouble that problem makes for the person (Table 8–1). The clinician is seeking information about both the frequency and the intensity of the problem.

I then explain to the patient and collateral that I will be reading a list of problems that people sometimes have; after each problem is read, I will ask the patient to say the number that best indicates how applicable the problem is for him or her (not over his or her whole life but just over the past 6 months). I suggest rounding up if the patient is stuck between two numbers. I request that if the patient is unsure about what I am asking, he or she tells me; in that case, I try to rephrase the item to make it more understandable. I prefer to ask the patient to respond first and then to have the collateral reply to the same item, immediately after the patient has responded. I ask the collateral to select responses based on integrating what he or she has seen with his or her own eyes or heard in talking with the patient or in the opinions of others (e.g., family members, teachers), assuming those opinions are considered reasonable. I emphasize that the respondents do not need to agree in their responses to each item. The clinician is interested in how each individual sees the situation from his or her own point of view. It is also important to keep participants from trying to persuade one another that they should change an answer already given.

DSM-5 Diagnostic Criteria

After completing the rating scale, I explain that there is one additional set of problems to ask about and that now just a “yes” or a “no” response is

TABLE 8–1. Response options for Brown Executive Function/Attention Rating Scales

Severity	Frequency
0=No problem	Never
1=Little problem	Once a week or less
2=Medium problem	2–3 times a week
3=Kind of a big problem	Almost every day

needed. “Yes” means that the patient has much more difficulty with that problem than most others of the same age; “no” means that the patient may have the problem but not in a way that is worse than in most anyone else of the same age. After verifying that all respondents understand the directions, I read aloud each of the nine ADHD symptoms of inattention and each of the nine ADHD symptoms of hyperactivity/impulsivity. I elicit and record a response from the patient and collateral, noting any item for which, on the basis of all available data, I would assign a different response.

Brief Measures of Working Memory

When taking a patient’s history and administering a normed ADHD rating scale along with considering the DSM-5 criteria (American Psychiatric Association 2013), the clinician is working primarily with just self-report data provided by the patient and observer-report data provided by parents, partner, or other collateral participant. These reports can be a very rich source of information about the patient’s past and present functioning in a variety of contexts, particularly when the clinician is skilled in eliciting relevant facts and examples while curtailing digressions that are unlikely to contribute to the diagnostic process. However, it is also useful to administer a couple of brief objective measures to directly assess the patient’s working memory, for both verbal and numerical information.

Working memory is one of the primary impairments for most persons with ADHD. Although there are multiple aspects of working memory, some important aspects can be assessed with brief standardized measures. For virtually every patient, regardless of age, I use a story memory task and a digit span test. For adults and adolescents 16 years or older, I use the two auditory verbal memory tasks provided in the

Wechsler Memory Scale, 3rd Edition (Wechsler 1997); they are identified as the Logical Memory test. This measure consists of two stories, each about one paragraph long with 25 word units, and a good scoring system with norms for various age groups from 16 to 89 years. My procedure is to say to the patient, "I'm going to read you two short stories; each is just a paragraph. Please listen carefully. After I read the first story to you, I'll stop and ask you to repeat that story back to me, with as close to the same words as possible, without making any changes. I don't expect you to remember every word of the story—there are too many words for that—but I am asking you to pretend you are a tape recorder and say it back to me with as close to the same words as you can." Immediately after reading each story, I stop and ask the patient to repeat it back to me, without my giving any prompting except to ask, when the patient has said what he or she can recall, "Anything else? Even if it's out of order, that doesn't matter." As the patient responds, I check off each word unit on the scoring sheet. The whole process is then repeated with the second story. More details on this measure are described by Kennedy et al. (2016). For children under 16 years, I use the Children's Memory Scale (Cohen 1997), which has stories and scoring systems for three different age groups as well as items for a test of digit span forward and backward with age-based norms for each age group.

After the two stories have both been repeated back to me, I administer a standard digit span test. I say to the patient, "Now I'm going read you some numbers and ask you to say them back to me in the same order that I say them to you." I then read the various strings of numbers, allowing about 1 second for each number and trying to avoid any chunking of the numbers that might give an unfair advantage. This is continued with each pair of number strings from 2 to 9 digits each until the patient misses two strings in one set or completes all the examples. I then say, "Now I'm going to say some more numbers, and this time I'm going to ask you to say the numbers back to me in reverse order. For example, if I say '1, 2' you would say '2, 1.'" When we have completed both the digits forward and digits backward, I thank the patient and then go on to take some additional history. After about 15–20 minutes, I stop and say, "Now I'd like to ask you to go back for a minute and tell me again anything you can still remember from that first story I read to you a few minutes ago." After listening and scoring the patient's response, I then ask him or her to tell me what he or she can recall from the second story I read. The response is then scored and set aside while we go on to the next segment of the clinical interview. I do not give the scores on these measures to the patient until the remaining sections of the evaluation are completed and it is time to report the diagnosis.

Explanation of ADHD With Queries

After completion of the patient history, rating scales, and brief memory assessments, I ask the patient and family to tell me briefly what they know about ADHD. Some patients come with an impressive amount of generally accurate information that they have obtained from careful reading of reliable books and articles about ADHD or from participation in the organization Children and Adults with Attention-Deficit/Hyperactivity Disorder (CHADD) or the Attention Deficit Disorder Association (ADDA) or from courses they have taken. Others come with virtually no information or with a lot of misinformation. This can be a good opportunity to clarify misconceptions and to see if there are any significant differences between patient and parents or between parents themselves in their understanding of ADHD and their motivation to obtain treatment.

Even with grade school children, it can be helpful to ask the child patient what he or she knows about ADHD or if the child knows anyone who has ADHD. Not infrequently, child patients report that they know a kid at school who has ADHD and that he is a real troublemaker who is not very smart and doesn't seem to care much about following the rules or getting his work done. In those situations, it is important for the clinician to point out that while some children with ADHD have behavior problems like that, there are many others with ADHD who are very smart, have no noticeable behavior problems, and work hard to do well in their schoolwork. If the only examples of ADHD known to the patient are peers with notorious behavior problems, that is likely to have a negative impact on how comfortable the child will feel if it is determined that he or she has ADHD. The patient is not likely to want to "join the club" of the class troublemaker.

After taking a few minutes to clarify the ideas about ADHD held by the patient and family, I usually say, "Now, I'd like to tell you how I think about ADHD because recent research has brought about many changes in how we understand this disorder. As I do that, I will stop from time to time to ask you (the patient) and your parents (or other collaterals) to tell me how much that part of ADHD that I have just described fits or does not fit you."

After that introduction, I give a brief description of the six clusters of the model of ADHD-related executive functions described in Chapter 2 ("A New Model of ADHD"). I describe each cluster briefly using several examples. I then ask the patient and collaterals to say how much that cluster of symptoms fits or does not fit the patient's usual patterns of behavior.

There are two purposes for this description. First, it is an attempt to provide the patient and collaterals with an updated, science-based

grasp of ADHD in clearly understandable language adjusted to their age and educational level. It can help to correct misinformation and to inform them of the nature and scope of impairments involved in this disorder. Second, by asking a couple of direct questions about how the description of those symptoms fits or doesn't fit the patient's experience, I can gain additional information to help me develop a more adequate base of information for making a diagnosis. Usually, I spend about 20 minutes on this portion of the clinical interview.

Following this description of the model of ADHD-related impairments of executive function, I ask the patient and collateral what they know about how people get ADHD. Many, but not all, are aware that this is a highly heritable disorder. I take just a few minutes to explain that out of every four persons diagnosed with ADHD, one has a mother or father who has had the disorder, whether the parent was aware of it or not. I also explain that among those who do not have a parent with ADHD, many have a grandparent or sibling or uncle or aunt who has or had the disorder. I mention that in past decades, and often in the present, children and adults with ADHD are not recognized as having this disorder because many clinicians have not received adequate training to correctly diagnose it.

At that point, I take a few minutes to explain our current understanding of what happens in the brain that causes symptoms of ADHD. I show a life-size plastic model of the human brain and explain that it is made up of 100 billion neurons. To help the patient and collaterals to imagine this, I point to my computer monitor and say that there are approximately 200,000 pixels on that screen. I ask them to imagine a skyscraper 110 stories high that has been totally covered with TV screens the size of my computer monitor. Once they capture that image, I tell them that if all the screens covering that huge building on all sides and all 110 floors were turned on and we could count all the pixels on all those screens, we would then have enough pixels to correspond to how many neurons one person has in his or her brain.

I then pick up a pad and make a simple drawing of a neuron with its branch-and-twigs organization and explain that these massive numbers of neurons communicate with one another using low-voltage electrical impulses. I then make a simple drawing of a synapse and explain the amazing fact that at their countless connection points, neurons do not actually touch one another; there is a gap between neurons for everyone, not just for those with ADHD but for all of us.

Using the drawing, I then show that each message traveling along the neuron must jump the gap between neurons, much as the energy of a spark plug jumps its gap. This paves the way for showing that this jump across

the synaptic cleft is facilitated by chemicals produced in the neurons and sitting in little bubbles near the edge of the gap. I mention that the electrical charge then attaches to receptors sitting on the receiving end of the opposing synapse and that if the electrical charge comes across strong enough, it quickly jumps the message along to subsequent neurons in the network to get it to where it needs to go. If the charge is not strong enough, it can fizzle at that neuron. In either case, release of the mini dots of the transmitter chemical is quickly followed by action from proteins on the sending side that operate like little vacuum cleaners that suck back the remaining transmitter chemical and repackage it for further action. I note that this action of release and reloading happens very quickly, so that 12 or more messages can cross that gap within one-thousandth of 1 second.

This description may appear very complicated, but when illustrated with drawings and adapted for the educational level of the patient and/or collaterals, it can usually be understood, at least in basic terms. Once that is said, I can explain that one important aspect of the problem in the brain of persons with ADHD is that those neurotransmitter chemicals are not efficiently released or reloaded, often causing some messages not to get across the gap adequately, unless they relate to something in which the person has strong personal interest or strong fear.

This leads me to say that for about 8 of 10 individuals with ADHD, carefully prescribed medication can improve this process. I emphasize that medication for ADHD cures nothing; it is not like an antibiotic that may cure an infection. This medication is more like eyeglasses that help someone improve his or her vision but only while individual is wearing those glasses. For some, medication brings huge improvement; for others, it is substantial, but not huge; for still others, medication helps a little, but not that much; and for about 2 of 10, medications currently available for ADHD do not improve functioning much at all.

Some will question whether it is necessary to take time to try to explain to patients and collaterals information about the nature of the problems in the brain for individuals with ADHD and about how the medications work. However, I have found that, except for very young children, most patients and parents or other collaterals appreciate receiving at least basic information about the brain processes involved in ADHD-related impairments and the basic elements of how medications for ADHD work. Such understanding often increases willingness of patients and their families to collaborate in the sometimes frustrating process of developing an effective treatment program.

After offering this elementary information about the biology of ADHD and mechanisms of action of medications for its treatment, I refocus the discussion to address the question of whether the patient does

or does not have ADHD. I say that there is no one test that can say for certain whether a person has ADHD or not. I explain that we look at all the information we have regarding the person's current functioning and earlier history to see what is easy for him or her and what is difficult; we see how the patient does on remembering the stories and the numbers; we look at what he or she and the collaterals say on the rating scales; we consider whether there are any other problems that are complicating things; and then we try to put the pieces together.

I then briefly summarize what I have learned about the patient's strengths and current difficulties, also mentioning relevant stresses and supports. In that context, I offer my impression that the patient does or does not meet diagnostic criteria for ADHD and/or any related disorders. I cite the data that support my diagnostic impression. I show the summary scores on the listing of DSM-5 diagnostic criteria, the obtained scores on the story memory task and the digit span test, and the summary scores on the ADHD rating scale that he or she and the collaterals helped to complete. If other disorders are occurring concurrently, I also mention those disorders. Often in this discussion, I utilize the circles inside squares graphic organizer described in Brown (2005b), which is available on my Web site (www.DrThomasEBrown.com). At that point, I usually inquire as to whether what I have just said makes sense to the patient and collaterals. I also invite and respond to any comments or questions they raise.

Following that discussion, I ask the patient and collaterals to consider what they want to do about the problems represented in this diagnosis. One option, of course, is to do nothing at present, to simply wait a while and see how things work out. Another option is to consider the possibility of further testing, for example, psychoeducational testing to assess for possible learning disorders or to ascertain eligibility for accommodations in school or work under Section 504 of the Rehabilitation Act of 1973, the Individuals with Disabilities Education Improvement Act, or the Americans with Disabilities Act. Another option is to undertake a trial of treatment with medication to try to alleviate the patient's ADHD symptoms. Possible benefits, costs, and potential risks of each of these options can then be discussed. More information about various treatment options is offered in Chapters 10 ("Practical Aspects of Medication Treatments for ADHD"), 11 ("Practical Aspects of Nonmedication Interventions for ADHD"), and 12.

Modifications of Assessment for Younger Children

When younger children are brought by their parents for assessment of possible ADHD, modifications need to be made to address the specific

needs of the child. For very young children, I usually begin by reassuring the child that this doctor visit is not going to involve getting any shots. Many children assume that anytime they are brought to see a doctor, they will very likely be getting an injection. It can be helpful to remove this fear at the outset.

In the beginning of the interview, I usually try to engage the child in some conversation at whatever level he or she can participate, depending on the age, verbal abilities, and willingness of the child to interact with me. I usually explain that I will need to be asking lots of questions: "Some questions will be for you, some will be for your parents, and others will be for all of you."

If you do not structure the interaction very soon after everyone is in the room, it is likely that the parents will begin a lengthy description of problems they see in their child, possibly embarrassing the child so much that he or she will be unwilling to respond directly to any questions from the clinician.

Usually, I begin with simple questions that the child is likely to be able to answer easily, for example, What is the name of your school? What grade are you in? What is your teacher's name? Do you like your teacher? Do you think he or she likes you? How are the other children in your school—are they usually friendly or are some of them mean to you? Of all the things you do at school, what do you like the most? Which things are the most difficult for you? What do you like to do for fun when you're not in school? Do you have one or two kids you play with a lot, or a whole big bunch of kids you play with, or do you do a lot of stuff by yourself?

After eliciting such information, I usually ask the young child to draw a picture for me. I have the child sit at a small table where he or she can work in the same room with his or her parents and me. I offer either crayons or markers with some drawing paper. I ask the child to draw a picture that has three things in it: a house, a tree, and a person. I suggest that he or she can put in anything else they choose, but I ask the child to remember to put in at least those three items. I then turn my attention to the parents, asking them what they are hoping we can accomplish together in this consultation. I then begin raising the questions described in the paragraphs above while also keeping an eye on the child, noticing level of engagement in the task and skill in doing the drawing. When the child is finished with the picture, depending on the child's age, I may ask the child to print his or her name and to write the alphabet and a series of numbers or simple math problems suitable for the child's age. Once these tasks are completed, I usually offer the child a limited number of choices for play: a box of Legos, some models of animals and action figures, or paper for drawings of anything he or she

chooses. Some children prefer to play with toys they brought with them. Usually, I allow the child to stay in the room while the parents and I are talking so the child can hear what is happening and, if he or she wishes, join in the conversation, so long as the child does not disrupt it. Meanwhile, I also am observing how the parents are or are not interacting with their child.

Additional Resources Useful for the Evaluation of ADHD and Related Problems

Books

A useful book providing comprehensive information for evaluation of ADHD in children and adolescents is *Essentials of ADHD Assessment for Children and Adolescents* by Sparrow and Erhardt (2014). A helpful guide for assisting parents concerned about the diagnosis of their child with ADHD or related disorders is *Quirky Kids: Understanding and Helping Your Child Who Doesn't Fit In—When to Worry and When Not to Worry* by Klass and Costello (2003). For assessment of ADHD in adults, the book *Could It Be Adult ADHD? A Clinician's Guide to Recognition, Assessment, and Treatment* by Jan Willer (2017) can be helpful.

Report Cards or School or College Transcripts

Report cards or transcripts of high school or postsecondary schooling may provide some useful information about the patient's past or current strengths and difficulties in academic work.

Teacher Evaluations

For children who are in prekindergarten through elementary school, it is often quite helpful to obtain information from the teachers who spend the most time with them. Often teachers will provide useful information in notes or on teacher forms for rating ADHD symptoms. This is most true when the child is in one class with the same teacher most of the day. For older students (e.g., in middle school or high school) who are changing classes throughout the day, most teacher reports may not be as helpful because the teachers do not have as much sustained opportunity to get to know individual children in so many aspects of their school activities.

Psychoeducational Testing Reports

Cognitive testing such as IQ tests and individualized achievement testing may provide additional information about the patient's strengths

and difficulties, but such measures are not necessary for making a diagnosis of ADHD. Some individuals seeking evaluation may already have had such testing recently or much earlier. If one or more reports of such evaluations are available, it may enhance the clinician's understanding of the patient's cognitive abilities. Commonly used measures for such assessment include the Wechsler Intelligence Scale for Children—Fifth Edition (WISC-V; Wechsler 2014), the Wechsler Adult Intelligence Scale—Fourth Edition (WAIS-IV; Wechsler 2008) IQ tests, and the Woodcock-Johnson IV Tests of Cognitive Abilities (Woodcock-Johnson 2016a). Achievement tests include the Wechsler Individual Achievement Test-III (Wechsler 2009) and the Woodcock-Johnson Achievement Tests-IV. Often students diagnosed with ADHD and seeking educational accommodations such as extended time for taking exams are required to submit results of such measures of ability and achievement. Another measure often helpful for assessing need for extra-time accommodations is the Nelson-Denny Reading Test (Brown et al. 1993). This measure for adolescents and adults allows assessment of the individual's vocabulary and reading comprehension abilities under both standard and extended-time conditions.

For students who have significant difficulties in learning a foreign language and who are seeking a waiver from foreign language requirements, the Modern Language Aptitude Test may be a useful assessment measure (Carroll and Sapon 2002).

Broader Screeners for Behavioral and Emotional Functioning

The following four instruments are often used to assess for a wide range of behavioral and emotional functioning difficulties:

- Behavioral Assessment for Children—Third Edition (BASC-3; 2–21 years) (Reynolds and Kamphaus 2015)
- The Child Behavioral Checklist (CBCL; 4–18 years) (Achenbach 1991)
- Conners' Comprehensive Behavior Rating Scales (6–18 years) (Conners 2008a, 2008b)
- Vineland Adaptive Behavior Scales—Third Edition (birth to 90 years) (Sparrow et al. 2016)

Scale for Autism Spectrum Screening

The Social Responsiveness Scale—Second Edition is a well-researched instrument to screen for problems related to the autism spectrum in children and adults. There is a preschool version for ages 2.5–4.5 years, a

school-age form for ages 4–18 years, and both observer and self-report forms for adults age 19 years and up (Constantino and Gruber 2012).

Instruments Less Helpful for Assessment of ADHD

A number of computerized tests are being marketed for “objective” assessment of ADHD. The most common is the Continuous Performance Test (CPT). Typically, these computer programs, such as the Conners’ CPT-II, the Integrated Visual and Auditory 2 (IVA-2), and the Test of Variables of Attention (TOVA 8.0), run about 15–22 minutes to rapidly present the individual with a series of letters or shapes on the computer screen and/or with auditory signals. The person is asked to respond when a particular target appears while avoiding responding to other stimuli. A printout then compares the individual’s performance with a series of scores comparing response speed and patterns of responding or not responding with sample norms. Some, like the Quotient and QbTest, also utilize a motion monitor to assess for hyperactive head movements while the individual is taking the CPT.

These computerized tests are inadequate measures of the complex range of functions now understood to constitute ADHD. Moreover, they consume a significant portion of the limited time available for a diagnostic assessment. Also, contrary to claims by some who sell such devices, performance on a CPT cannot be used as a valid measure to assess the effectiveness of medication treatments for ADHD; that task requires longer-term self-report data regarding functioning of the patient in many different types of tasks and activities at various times of day.

Another set of measures not very helpful in assessing for ADHD is a battery of neuropsychological tests. There is a collection of neuropsychological tests often referred to as “tests of executive function.” These include various laboratory measures such as the Stroop Test (Stroop 1935), Wisconsin Card Sort (Heaton et al. 1981), Tower of Hanoi/Tower of London (Shallice 1982), and Rey-Osterreith Complex Figure (Waber and Holmes 1985), all of which are administered by a neuropsychologist, usually in a small office setting. These tests have proven helpful for identifying certain neurological impairments such as brain damage from stroke or trauma, but they are not effective for assessing impairments of executive functions identified in the model of ADHD presented in this book.

If executive function impairment is defined as getting very low scores on neuropsychological “tests of executive function,” only about

30% of children or adults diagnosed with ADHD appear to have significant executive function impairments. Paul Burgess (1997) argued against trying to assess executive function impairments with such simple tasks. He stated:

Goethe's famous comment that dissecting a fly and studying its parts will not tell you how it flies could almost have been intended for the neuropsychology of executive function....[E]xecutive functioning is called into play only when the activities of the cognitive architecture must be coordinated.... Thus, if a methodology is used where a task is broken down into its component parts, no deficit will be discovered in dysexecutive patients. (pp. 99–102)

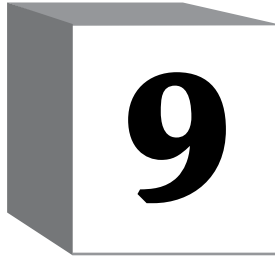
R.A. Barkley (1997, 2012b, 2015) and I (Brown 2000, 2005a, 2006, 2013) claim that all children and adults with ADHD suffer from significant executive function impairments relative to others of similar age and that developmental impairments of these executive functions are the essence of ADHD. We assert that these impairments can be seen much more clearly and validly in assessments of how individuals with ADHD perform over time in a wide variety of tasks for which they need to manage themselves than in any battery of neuropsychological tests.

Summary

Given that all persons have some of the symptoms of ADHD sometimes, it is important to have an effective way to determine which individuals experience sufficient chronic impairment from ADHD symptoms to warrant diagnosis and treatment. There is no single test for ADHD—no laboratory test, genetic test, computer test, imaging test, or battery of neuropsychological tests that can adequately determine which individuals meet diagnostic criteria for ADHD and which do not.

The complexity and situational specificity of ADHD symptoms requires information about how the individual functions in a wide variety of situations and tasks of daily life relative to others of the same age. The most effective tool for diagnosis of ADHD is a well-conducted clinical interview with the patient (and, if possible, one or two people who know the patient well) by a clinician who is familiar with ADHD and with other medical or psychological disorders that might produce similar symptoms in a person of comparable age.

This chapter includes a thorough outline of what a comprehensive clinical evaluation for ADHD should include for various age groups. It also describes some instruments advertised for use in clinical evaluations that are less helpful for assessment of ADHD.



Emotional Dynamics in Individuals, Couples, and Families Coping With ADHD

THERE IS NO SINGLE PROFILE OF EMOTIONS common to all individuals with attention-deficit/hyperactivity disorder (ADHD). There is much diversity due to differences in age, temperament, personality style, family life, cultural background, and many other variables. Yet there are some ADHD characteristics and some situations often experienced by many with ADHD (and those involved with them) that cause particular patterns of emotional dynamics to emerge more frequently among these individuals. In this chapter, I describe some emotional dynamics often reported by children, adolescents, or adults with ADHD and those who interact with them.

The palette of human emotions is rich and variegated. It includes happiness, enthusiasm, interest, disinterest, boredom, delight, worry, fearfulness, panic, terror, frustration, annoyance, anger, rage, pride, envy, embarrassment, shame, guilt, jealousy, disappointment, discouragement, grief, hopelessness, sadness, depression, longing, trust, optimism, expectancy, determination, affection, passion, love, hope, and many other emotions.

Emotions are dynamic in that they often change and interact, sometimes in an instant, sometimes over hours, weeks, or years. Often they change in response to specific circumstances of a situation, what someone else says or does and how individuals perceive and react to one another in given moments and over time. Sometimes emotions are quite transient, a flash of anger or a moment of jealousy, pride, or affection that may quickly be modified or replaced by other emotions that may be quite contradictory. Emotions may also be persistent over much of a lifetime, absorbed into the fabric of one's personality across differing settings.

Emotions vary not only in type but also in intensity. Sometimes emotions arise with fierce or crushing intensity; at other times, that same emotion may be scarcely noticeable. Emotions also vary in level of consciousness. Sometimes a person is fully aware of a particular emotion in a given moment, yet at another time, that person may be totally unaware of an emotion that others readily recognize and respond to.

In all persons, emotions tend to arise in multiple mixes and blends. Sometimes the blend is subtle and convergent—affection and longing, pride and hope. In other instances, emotions strongly conflict with one another—interest and fear, pleasure and guilt, pride and resentment, love and hate. Sometimes the conflict is immediate; in other instances, one emotion may be followed quickly or gradually with another, or a person may experience rapid alternation between one emotion and another. Examples of emotions described in this chapter may be experienced by various individuals in many different ways, only some of which are included here.

Case Example: A 7-year-old who feels picked on by adults

Seven-year-old Jimmy's mother met him at the front door as he came home from school. She gave him a hug and asked, "How was school today?" Jimmy dropped his schoolbag and jacket on the floor in front of the door and, without answering, headed toward the kitchen to find a snack. His mother called him back to pick up his jacket and schoolbag. Jimmy came back with a grumpy face and announced, "School was terrible; it's always terrible. She's always yelling at me just like you are now!" His mother responded, "I wasn't yelling at you, I just asked you to come back to pick up your jacket and schoolbag and put them where they belong, not just leave them in front of the door." Jimmy picked up his stuff grumbling, "It's always that way, you and my teacher and my soccer coach, all of you are always yelling at me and saying that I did something wrong or didn't do something I was supposed to do. Nobody else ever gets yelled at so much all the time."

Young children with ADHD, especially if it is not effectively treated, often complain that their parents, teachers, and other adults are constantly yelling at them. This “yelling” may sometimes involve angry comments with a raised voice. Although often it is simply a matter of very frequent reminders and corrections that may be necessary, they may leave the child feeling singled out, far more often than other children, as the one who is not doing what is expected. Many teachers and parents of children with ADHD report that they need to give reminders or corrections to these children as many as 5–10 times more often than to most of their classmates or siblings.

Even when these frequent corrections are done with minimal intensity and without any overt annoyance, the impact on the child’s view of self may be substantial. When this pattern goes on with much daily frequency for many years, as it does for some children with ADHD, the result is often a combination of feeling picked on, unappreciated, and incompetent, relative to others of similar age.

One antidote to this problem is for parents and teachers to find or create frequent opportunities to recognize when their child is doing something well so they can give recognition or praise for doing the right thing. In the routines of daily life, it is easy to mention mostly the actions one finds frustrating or wants to see changed. Acknowledgment of appropriate, nonproblematic behaviors that one would like to see more frequently and to reinforce can often be overlooked.

When a child complains about others being too critical or getting too irritable with him or her, it may be helpful to listen to the child’s complaint and perhaps offer some empathy or validation: “Yeah, it’s not much fun to feel like you’re always the one getting told you’re in the wrong. Sometimes it may be that you really are doing something you should change, but other times it may be that the grown-up is just having a bad day.” Sometimes such complaints are an indirect way of asking for some recognition and encouragement to counter frustrations of the day.

Case Example: An 8-year-old with outbursts of rage followed by guilt

The parents of 8-year-old Michael explained, “He’s very polite and well behaved 90% of the time, but several times a day, like when we have to tell him to do a simple thing like turn off a video game he’s playing so he can start getting ready for bed, he often, but not always, will fly into a rage, swear at us, and head-butt us, and then keep kicking against a door. This goes on for about 10 or 20 minutes, and then he starts crying and says, ‘I can’t move, I’m stuck, come help me.’ He wants one of us to

come hold him quietly for a minute or two, then he tells us he's very sorry for being so bad, and then it's over, and he's all good again until the next time." Michael's mother shook her head and said, "We've tried systems to reward him for any day without these meltdowns, but that didn't help at all." His father said, "When he does that stuff, it makes me so mad that I start screaming at him, even though I know that does no good at all and probably makes it worse." Michael's parents also reported, "He's had a few episodes at school where he had meltdowns and hit other kids; he got suspended twice, but those are rare. Mostly, this just happens at home."

Two years prior to my seeing him, Michael had been diagnosed by another doctor as having ADHD; she prescribed some stimulant medication for him, but that had to be stopped because it intensified the meltdowns and anger outbursts. I arranged for Michael to begin a trial of a nonstimulant medication to help him control his intense episodes of anger. I also met individually with Michael and with his parents, and I met with the three of them together.

This was not just a problem with Michael; it was a problem for the whole family and was fueled by multiple factors. Michael clearly had a very short fuse when he was frustrated; yet his impulsive angry outbursts were quickly followed by strong feelings of guilt and fear. Michael's father reported that his own father, his father's father, and his brother had all struggled with brief but intense outbursts of rage similar to what Michael experienced. This suggested that genetic factors were probably involved. Michael's dad also reported that he himself felt overwhelmed with anger and screamed at Michael with intensity anytime Michael acted angry. This intensified Michael's anger and his fear of his own temper and of his father.

Michael's father also acknowledged that he himself had been diagnosed with ADHD and was taking medication for it. Unfortunately, his medication dosing was helping some but not much. I suggested that he discuss the possibility of a change of medication or dosage with his prescriber.

The parents also explained that they were struggling with financial pressures. The husband had been laid off and had been unable to find a new job for more than a year. This was frustrating and embarrassing to him because his wife was working long hours to support the family while he was staying home taking care of the house and Michael. Meanwhile, Michael's mother was clinically depressed and also frustrated that her husband often seemed not to be pulling his weight at home. Both parents were often in conflict, unable to provide much emotional support for one another or for Michael. Both clearly loved their son in-

tensely and were committed to one another, but they were feeling increasingly frustrated with him, embarrassed that they could not control his outbursts or their own, and hopeless about how to help him and one another.

Case Example: An 11-year-old who “goes on strike” when asked to write

Eleven-year-old Sandy was the best goalie on her travel soccer team. She was well liked by her teammates and often praised by her coaches for her skills and consistent effort. Yet she hated school. She got along all right with her classmates and usually got passing grades, but she was seen by her teachers as stubborn and temperamental. Now in sixth grade, she was having increasingly frequent incidents of what the teachers called “going on strike.” When the class was asked to write paragraphs or brief essays, Sandy often wrote nothing. When the teacher asked what was wrong, Sandy just stared ahead and did not respond. When the class was given a timed challenge test for math problems, Sandy often started with the others and then suddenly stopped, tore up her paper, refused to talk, and began repetitively kicking the desk in front of her until the teacher sent her to the principal, who told Sandy to complete the work at home and return with a better attitude. Sandy’s parents reported that it often took them 5 or 10 minutes to explain the writing assignment to Sandy and help her get started, but then she was able to complete the task, producing results that the teacher said were fully satisfactory.

When I first met with Sandy and her parents, she was initially unwilling to answer any of my questions, but as I continued to talk with her parents, she gradually warmed up and began to respond, first with just facial expressions and nods or head shaking, then gradually with words. Her mother told me that Sandy had been slow to speak as a young child, producing no words until she was 3 years old, but at that point she began suddenly to speak in sentences. I also learned that both Sandy and her mother had been diagnosed with ADHD several years earlier and that both were taking stimulant medication that they found helpful.

Over a series of conversations together, I found that Sandy readily spoke with me about how her soccer team was doing, yet she was unwilling to discuss any incidents in school where the teacher had complained to her parents about her behavior. When her parents told me how teachers were complaining about her being angry, being stubborn, and going on strike, Sandy kept her head down and stared at the floor as her eyes began to fill up with tears.

Gradually, it became clear that Sandy’s teachers were mistaken when they interpreted her “on strike” behavior as anger and stubborn-

ness. That behavior was covering intense feelings of shame and fear. Sandy had very high standards for herself, especially for expository writing and for math. She also had ADHD-related problems with working memory and processing speed. Her working memory problems often caused her to get confused about oral directions given for writing assignments, so she did not understand and remember what she was being asked to do. Her slow processing speed made it very difficult for her to keep up with her classmates in doing tightly timed math challenges. When she saw her classmates working much faster on the timed math quizzes, she felt embarrassed and gave up. When she felt confused about how to start her writing assignments, she froze in shame and was unable to respond to the teacher's offers of help. What appeared as oppositional behavior was, in fact, a diversionary maneuver that served to distract her, her classmates, and her teacher from what Sandy saw as humiliating failure.

I asked Sandy's pediatrician to add a selective serotonin reuptake inhibitor (SSRI) to the stimulant medication Sandy was taking for her ADHD; gradually that helped to reduce her chronic anxiety. I also tried to help Sandy and her parents to understand the puzzling intensity of her reactions to confusion and perceived failure. Her mother then reported that both her sister (Sandy's aunt) and Sandy's maternal grandmother also had long-standing reputations in their family for quickly getting angry and then pulling into their shell when they felt anxious, especially when stress occurred in a social situation.

We had a meeting with Sandy's team of teachers, who readily agreed to give written directions for writing assignments and to provide extra help for Sandy to learn how to get herself started on writing assignments. Her pediatrician, her parents, and I also arranged to make some adjustments to Sandy's ADHD medications to provide more help for her problems with working memory and processing speed.

Case Example: A 12-year-old rejected by her classmates

Twelve-year-old Jessica wasn't eating much and was unusually quiet at the dinner table as her parents, brother, and sister were enjoying the meal and exchanging stories about events of the day. Noticing that Jessica didn't seem her usual self, her father said, "Jessica, is there something wrong? You don't seem to be your regular self here tonight." Without a word, Jessica started to cry. She got up from the table, ran to her room, and shut the door. Her mother followed and put her arm around Jessica as she lay sobbing on her bed. At first, Jessica did not respond to her mother's quiet questions about what was so upsetting, but after a few minutes she blurted out, "Every other girl in my class got in-

vited but I didn't. They all hate me! I can tell. They tried to keep this sleepover birthday party a secret, but I heard them talking about it when I was in the bathroom and they didn't know I was there. I heard Shelly say, 'You can't tell Jessica about this, I've invited all of you except her. She just doesn't fit in.' And they all said, 'Yeah, nobody else will want her there either. It'll be a lot better without her.'"

This sort of rejection by peers would be difficult for any child, but children (and some adults) with ADHD tend to get overwhelmed in such situations. Sometimes this is because the child with ADHD is especially sensitive to rejection. Yet for many with ADHD, the problem is that rejection from peers occurs more quickly and more often because the child with ADHD may actually be too impatient, too immature, too demanding, too sensitive to criticism, or too bossy with other children and not as willing to compromise in working out interpersonal conflicts as most others of similar age. One study obtained peer ratings for 165 children with ADHD ages 7–9 years and did follow-up peer ratings for 6 years. They found that 52% of those children were rated in the rejected range by their peers, whereas only 1% were rated as having popular status (Hoza et al. 2005).

It can be extremely difficult for parents to find an effective way to help their child in peer group conflicts without making the situation worse. They may intervene and talk with the parents of the other children involved or with the teacher to try to get peer interactions at school changed. Yet if the other children are confronted by their own parents or their teacher and punished for rejecting the outcast child or urged to befriend him or her, those children may comply superficially while subtly intensifying their rejection or bullying of the outcast, who is now seen as the tattler who got them into trouble.

Case Example: A 12-year-old whose divorced parents disagree about his treatment

Jerry's father brought him to be evaluated for possible ADHD when he entered sixth grade. He explained that Jerry had been struggling with reading since third grade, the year that his parents had undergone a bitter separation and divorce. Teachers described Jerry as friendly and bright but also restless and having a lot of difficulty in understanding and remembering what he read. Jerry's father, himself a teacher, wanted to see if Jerry might have ADHD so he could get help before starting middle school. Jerry's mother refused to participate in the evaluation because she felt that Jerry didn't need it. A full clinical evaluation found that Jerry was a very bright 12-year-old who fully met diagnostic criteria for ADHD. At the evaluation, Jerry said that he wanted to try treatment with medication, something that had been quite helpful to one of his friends. His pediatrician prescribed appropriate medication, but Jerry

then refused to start taking it. He reported that his mother and her new husband had told him that he did not need medication for ADHD, and they warned him that ADHD medication would stunt his growth.

Like many other children of divorced parents, and some children of married parents living together, Jerry was caught in the middle. He deeply loved and respected both of his parents, but on this issue, and many other matters, each parent was urging him to do something that was strongly opposed by the other parent.

Jerry's father had suffered with ADHD when he was a boy and did not get diagnosed or treated until he was in college, after he had struggled in school for many years. He wanted to protect Jerry from similar struggles. Jerry's mother had a brother who had struggled with drug addiction and dropped out of high school because of it. She was terrified that Jerry might get addicted to any medication he took for ADHD. She also had recently married a man who was convinced that medication for ADHD would stunt Jerry's physical growth; he was currently one of the shortest boys in his class. Jerry's parents shared legal custody, and Jerry lived with each of his parents on alternating weeks.

Jerry told me that each of his parents had been talking with him endlessly about how important it was for him to follow the recommendation that he or she was making. He felt that he would enrage and seriously worry his mother if he began taking the ADHD medication that she felt could endanger him. If he did not take the medication, Jerry felt he would be seriously disappointing his father and rejecting something that his father was convinced would be immensely important for Jerry's future success in school. Each parent was asking for Jerry's loyalty and compliance with his or her own wishes.

I had several meetings with Jerry and both of his parents to try to help each of them see the bind in which Jerry was caught. I also provided accurate information about how the medications work, explaining that medications are often, but not always, effective; that they do not stunt ultimate growth; and that the risk of problems with addictions is greater for children with ADHD who are not treated with medications than for those who are treated. Eventually, we reached agreement from both parents to start a trial of medication for ADHD treatment while carefully monitoring its effectiveness and Jerry's physical development.

Case Example: A 13-year-old who cuts herself when she gets disappointing grades

Friends of 13-year-old Cindy reported to their middle school advisor that they were worried about her because she had shown them fresh

scars from several small cuts she had made on her arm with a razor blade. Her teachers said that Cindy, a girl new to this school, often seemed tired and somewhat inattentive in class. Her homework was always done well and handed in on time, but her test scores were often much lower than would be expected from someone who performed so well on homework assignments. A few teachers wondered if Cindy had been getting too much help from her mother when doing her homework. When I met with Cindy's mother, she told me that Cindy was totally independent in doing her homework and worked 3 or 4 hours most evenings to get it done. She also said that Cindy got very upset when she got low test grades because she was trying to show her father, who lived out of state, that she was a smart, hard worker. Her mother was unaware that Cindy had been cutting herself.

When I met with Cindy and her mother together, I learned that the self-cutting had begun shortly after Cindy came to this school and usually occurred after Cindy received a low grade on a test. Cindy said that she had heard about self-cutting from a TV show and decided to try it one day when she came home from school after receiving an almost failing grade on a test for which she had spent a lot of time studying the night before. She said that seeing a few drops of her blood after making a small cut on her arm seemed to take away some of her feelings of sadness and shame about doing poorly on the test. Since then, she had repeated the self-cutting on several other days when she received a low test score.

As Cindy talked about her difficulties in remembering material she had read and studied to prepare for tests, it soon became clear that she was suffering from undiagnosed ADHD, which had not been recognized at her previous school. Like many other bright students with ADHD, she had done very well in elementary school, where most of her class time was spent with the same teacher. Now, in middle school, where she had to deal not only with a new school setting but also with changing classes, multiple teachers, a more challenging curriculum, and heavier homework demands, her underlying impairments of executive functions had become more noticeable.

Cindy felt there was a lot at stake with her grades. Her parents had recently divorced, and her father had moved to take a job a thousand miles away. He kept in touch with her daily by phone, but much of his talk with her involved asking her about what homework she was doing and what grades she was getting. He praised her a lot for good grades and kept encouraging her to work harder when she got low grades. She feared that he would be disappointed and, perhaps, lose interest in her if she did not maintain high grades. That motivated her intense homework efforts and led to her fearful shame that prompted the self-cutting.

Recognition of this dilemma led to diagnosing and treating Cindy for her ADHD and also to a series of phone conferences involving Cindy and both of her parents so they could provide more of the support she needed.

Case Example: A 15-year old whose parents battle over his punishment

Don, a 15-year-old high school freshman, had many friends and was especially popular because he was one of the best athletes on the freshman football team. However, he was not well liked by his teachers. Most of them found him annoying because he was often argumentative and disrupted class with wise guy comments. He tended to score high on tests but often did not do his homework.

After he got warnings of possible failure in two courses, his mother asked the teachers for weekly reports and told Don that she would give him double allowance for each week with a good report. The following 4 weeks brought no improvement in the weekly reports. Don complained that the teachers simply disliked him and were always looking for something to complain about.

At that point, Don's father called the football coach and insisted he was taking Don off the football team for the rest of the season. He also told Don that he would be grounded: no after-school or weekend activities until he produced good reports for at least 4 successive weeks. Don's mother protested that his father's actions were too harsh and would make things worse. She wanted to take Don to be evaluated for ADHD because a friend had suggested that as a possible reason for his problems. His father argued that Don had no problem except for insufficient self-discipline; he feared that ADHD might be used as an excuse for Don's laziness.

Parents of children with ADHD often become polarized into extreme positions and spend much time and energy accusing one another of being too harsh or too lax in dealing with their child. One parent may argue that the child is suffering considerably from the impairments related to ADHD and needs much more support and understanding rather than confrontation and punishments. The other may argue that the child needs to be punished promptly for misbehavior or failure to do assigned tasks so he or she can learn eventually to discipline himself.

Unfortunately, such arguments often lead to each parent taking an increasingly extreme position in response to the arguments of the other, diminishing their ability to work together to reach mutual decisions about how to handle the difficult task of figuring out when to hold the line and crack down versus when to ease up and lend more support.

Parents faced with these difficulties often benefit from consultation with a professional who can help them develop a shared, science-based

understanding of ADHD and related problems. This should include an understanding that individuals with ADHD tend to have a few specific activities in which they are strongly interested; they are able to focus on and perform these activities quite well even though they have so much difficulty in working effectively on most other required tasks. Parents can also benefit from talking with a professional familiar with ADHD about how to make reasonable, constructive use of parental incentives, rewards, and punitive consequences as well as effective treatments to help their son or daughter with ADHD to develop adequate self-discipline.

Case Example: A 14-year-old who struggles with her homework after losing mother's help

Joanne had just completed her first semester of high school. Her grades had dropped to barely passing, much lower than the honor roll grades she had been getting throughout elementary and middle school. When her mother brought Joanne to see me, she was angry because Joanne had hidden her report card for more than a week because she felt ashamed of the big drop in her grades. Her mother was also worried because Joanne had been crying a lot and was repeatedly saying that she felt really stupid and was uncertain whether she would ever graduate from high school. Joanne had been taking a long-acting medicine for ADHD that had been helpful since fifth grade, when she was diagnosed by her pediatrician. Also, for years, Joanne had gotten a lot of help with homework from her mother every day after school; she was cared for at the time by her grandmother while her mother worked as a nurse on the night shift. Since September, that homework help had stopped because her mother was now required to work a 3:00 to 11:00 P.M. shift. Meanwhile, Joanne had been selected to be a cheerleader at her high school and had to attend practice after school each day. As we discussed this in my office, Joanne was crying because she had disappointed her mother and grandmother. Joanne's mother was also upset; she felt that her having to work the afternoon shift was ruining her daughter's education, but as a single mother, she felt she had no choice.

The transition from elementary school to middle school is difficult for many students; adapting to high school is usually much more difficult, especially for students with ADHD. In elementary school, students are usually with one teacher for most of each day. That teacher can provide structure and continuity to assist students with self-management and organization. Usually, middle school brings increased demands for self-management because of having multiple teachers and changing from one classroom to another. High school imposes even greater demands for self-management because of an increased number of class changes throughout each day. High school also escalates the need for organizing homework and longer-term assignments. For children who

struggle with executive functions, as those with ADHD do, the transition into middle school and then into high school is usually much more difficult.

The high school transition is often problematic for parents too because communication between parents and teachers tends to be more limited in that setting. Unless the school provides and maintains an exceptionally effective Web site monitoring system, parents are unable to monitor what assignments have been given in each subject, what the specific requirements are, when each assignment is due, and whether their son or daughter is getting them done adequately and in on time. Many high school students quickly learn to manage their work adequately, but, like Joanne, many with ADHD struggle considerably, especially during their freshman year.

Joanne clearly cared a lot about doing a good job with her schoolwork, but the loss of her mother's daily support for organizing and completing homework presented her with tasks for which she was not prepared. She was accustomed to meeting with her mother each afternoon for more than an hour to review what homework needed to be done and to work under her mother's close supervision and encouraging support. Her mother's unavailability during those important hours was a significant loss.

Joanne was proud of being chosen to be a cheerleader for her school, and she enjoyed attending the practice sessions every day after school. However, this meant that Joanne now needed to do her homework after dinner rather than immediately after school each day. One effect of this change in routine was that the ADHD medication Joanne had found helpful for many years wore off before she got home to do her homework. We arranged for her to get a short-acting booster dose of her ADHD medication to take in late afternoon so it would provide coverage for doing homework after dinner but not interfere with her getting to sleep in the evening. This helped to improve her focus, but the medication could not replace the help Joanne had previously been receiving from her mother.

Case Example: An 18-year-old who fails in his first semester of college

Alan was diagnosed with ADHD and Asperger's syndrome when he was in third grade. With appropriate medication for his ADHD and strong support from his parents, Alan earned good grades in school and participated successfully in Boy Scouts and in the robotics club at his high school. Alan was proud that he had been admitted to the engineering program at his state university, but he felt more than a little nervous

when it was time to pack up his stuff and move into the dorm on the university campus 2 hours away from his home. He was quite shy, except with family and a few friends he had known since elementary school. When he arrived on campus, Alan attended his classes but mostly kept to himself in his room, with the exception of getting meals and using the bathroom. He struggled with writing papers, but he was too fearful to seek help from the writing clinic. He got poor grades on many of his tests because he did not feel comfortable asking any other students to study with him and was terrified of going to open office hours where his professors were available for individual consultations with students. Alan was ashamed of his declining grades and kept telling his parents that college was difficult but he was doing OK. He did not let them know how much difficulty he was actually having until his first semester was over and he received failing grades in four of his five courses.

Alan came with his parents for a consultation with me shortly after he received his semester grades. It quickly became clear that he was an extremely bright young man who continued to suffer from ADHD and also from severe social anxiety and some characteristics of Asperger's syndrome. After considering alternatives, Alan and his parents decided that he would request an immediate medical leave from the university and return to living at home while he began a medication trial, engaged in psychotherapy with me, and enrolled in a couple of engineering-related courses in the local community college.

I had several joint meetings with Alan and his parents to address Alan's intense shame over his failure at college, his guilt over having kept his difficulties secret from his parents until it was too late to salvage his semester, and his intense fears about whether he would ever be able to return to the university and be successful. His parents felt guilty that they had not been more active in keeping track of how Alan was doing; they also resented the fact that they had paid a very sizable tuition for a semester that yielded no academic credits. Another difficult issue was how Alan and his parents would explain to neighbors, extended family, and friends why he was now living at home and going to the community college when all of them had understood that he had been enjoying a successful first semester of his freshman year at the university.

Alan's treatment included SSRI medication to address his intense social anxiety, stimulant medication to alleviate his ADHD symptoms, and cognitive-behavioral treatment to learn to develop the social skills needed to interact with faculty, staff, and other students at the community college. He needed coaching to plan how to approach classmates to form small study groups for course work review and projects in both of his classes. We discussed how to choose students he might feel comfortable approaching and what words he could use to initiate conversation,

how to learn their names, and how to get contact information. With that support, he gradually discovered that he was able to make successful contact with a few students in each of his classes to work together on problem sets, to review for tests and exams, and sometimes to have a good time with. Alan continued at the community college for the summer program and then decided to take an additional year at the community college. He did well in that year, both academically and socially; this led to successfully resuming his studies and living in the dorm at the university campus.

Case Example: A 22-year-old in conflict with his girlfriend and her reaction to his ADHD

George had been seeing me intermittently for treatment of his ADHD since he was a freshman in high school. He was now 22 years old and was home from college for the summer; he called to ask if he could bring his girlfriend, Debbie, with him for a consultation with me. When they arrived, George explained that he and Debbie had been dating each other exclusively for almost a year, and she wanted to come with him to talk with me about ADHD. When I asked what they wanted to discuss with me, Debbie pulled a list out of her purse and began to ask one question after another about ADHD.

Her first question was "How much do people with ADHD change as they get older?" I asked her to give me an idea of what kind of changes she was wondering about. She said, "Do they get more mature, more responsible about doing what they say they will do? Do they get better at showing up on time when you're planning to go someplace together? Do they get better at listening to what other people are trying to say?" I asked George what he thought was Debbie's reason for wanting to get answers to these questions. He responded, "She wants to know if my ADHD problems will ever get better than they are now."

I explained that there is no one pattern of behavior change that is true for everyone with ADHD. Sometimes ADHD characteristics get better as one gets older, sometimes they get worse in response to life experiences and demands, while other ADHD characteristics may persist for a lifetime—much the same as characteristics of anyone else. Debbie was not happy with that answer. She emphasized that she was now 22 years old and needed to know if this relationship with George was going to work out for her over the long term. I asked if she felt that George currently had any desirable characteristics that she enjoyed and appreciated. She mentioned that she liked his great sense of humor and his spontaneity, that he often came up with interesting comments and fun things to do. She acknowledged that he was very bright and did well in most of his courses. But then she said emphatically, "But if I'm going to stick with him, there are a lot of things he will need to change!"

George asked her, "What are you talking about? What is it that you feel I have to change in order for you to want to stick with me?" She re-

sponded in a scolding tone, “You know exactly what I’m talking about—I tell you about this same stuff all the time. You’re always late when you’re supposed to meet me, and there’ve been some times when you’ve totally forgotten what we planned to do. Lots of times when I’m trying to talk with you, you’re not really paying any attention, you’re just messing with your phone. Sometimes you go for days without even sending me a text, you get too busy with your schoolwork or just hanging out with your guy friends. And when I try to tell you what I need, you just try to change the subject or go do something else. You don’t really answer or have a decent conversation to resolve things.”

Debbie then turned to me and asked, “Can’t you change his medicine so he can be better about these things?” George answered before I could respond. He said, “What do you think Doc is going to do, get me some medicine that will totally get rid of my ADHD problems and make me some kind of robot that will do everything the way you want me to? Does it count at all that I love you? Is the way I am now really that bad? You’re not exactly perfect all the time yourself.”

As we neared the end of the appointment time, I told Debbie and George that I thought they had a lot more talking to do to sort out what each of them was appreciating and feeling frustrated by in the other. I also cautioned them that in any intimate relationship, it’s important to recognize that while people can change over time, for better or for worse, it’s likely to be frustrating if someone commits to a long-term relationship with the expectation that the other person has to change in major ways in order to be an acceptable partner. That is a recipe for disappointment, whether the issue is ADHD or anything else. I also mentioned that if one is looking for a perfect partner, it is likely to be a long wait.

Case Example: A divorced woman immobilized by undiagnosed ADHD and shame

Karen was 48 years old and had been divorced from her husband for 3 years when she came for an initial consultation with me because she had read *Smart but Stuck* (Brown 2014) and felt that it described her. Karen explained that she struggled through high school and then attended four different colleges before she completed her degree. She worked in sales for 10 years before she married. She then had two sons, now teenagers, and had been caring for them full-time since her divorce. Over the previous year, she had also been caring for her mother, who was quite ill and who died from cancer a few months before our first consultation. Karen reported that she had been treated with several different medications and had also tried a variety of homeopathic medicines for her long-standing chronic depression and anxiety. She had not found any of them to be helpful for reducing her constant feeling of being overwhelmed and disorganized. “My house is a mess with a lot of clutter and huge piles of pa-

perwork. I'm always late for everything. I spend a lot of time on the computer just surfing, and I can't stop myself to get to the grocery store to get something to cook for dinner and have ready when the boys get home from school and team practice. And in all this, I'm a perfectionist. I feel stuck, especially over the past few years, unable to do what I need to do to take care of my kids and myself. I'm ashamed of my house, of my life, and of my parenting. It's never been this bad before."

Karen, a very intelligent woman, was staggering under a huge burden of self-criticism and hopelessness, as well as her grief over the recent loss of her mother. As we began to work together, it became clear that her self-criticism was a long-standing problem. Though quite bright, she had struggled with schoolwork from her earliest years of school. She had been raised in a well-to-do family with high expectations. Her parents and teachers were puzzled as to why a girl who seemed quite bright and quick to grasp ideas in discussion had so much difficulty in completing assignments and passing examinations. Her siblings had been quite successful in competitive colleges while she transferred from one college to another until she finally completed her degree in the fourth university she attended. Her chronic anxiety and mounting depression were recognized, but treatment for these did not address her undiagnosed ADHD. Criticism from parents, teachers, and siblings had fueled her self-criticism for most of her life.

Karen's marriage compounded her difficulties. Her husband struggled with multiple problems, including excessive drinking and what she later learned was severe ADHD. Both of their sons also had ADHD with some behavioral problems; this was not recognized until their adolescence and intensified the difficulties the parents faced during the 14 years before they separated.

After she experienced some incapacitating side effects from medications prescribed for her anxiety and depression, Karen gave up on prescription medications and sought help from a homeopathic practitioner. She felt only slight improvement from the homeopathic she was given, but she appreciated that those supplements had not caused significant adverse effects in her apparently sensitive body chemistry. Nevertheless, none of the remedies she had been given provided any help in alleviating her substantial executive function impairments, which were the primary focus of her frustration and shame.

Karen emphasized that her problems with executive functions had worsened considerably in recent years. Those years coincided with the onset of menopause. Many women who have ADHD find that their ADHD symptoms worsen as they enter menopause, and some women who have never had significant ADHD symptoms earlier in their life be-

gin to suffer from executive function impairments quite similar to ADHD as they enter menopause. This makes sense because estrogen is one of the primary modulators of dopamine in the female brain. Dopamine is the neurotransmitter chemical that facilitates communication within neural networks of the brain that support executive functions of the brain. For some, not all, women, the reduction of estrogen that occurs in menopause brings an initial onset of executive function impairments or, as in the experience of Karen, the estrogen loss can substantially worsen pre-existing ADHD impairments that have been present for many years, especially if their ADHD is not adequately treated. Our research group has published three scientific journal articles (Epperson et al. 2011, 2015; Shanmugan et al. 2017) describing our research demonstrating that ADHD medications can be helpful for some women in alleviating these executive function impairments of menopause.

Effective treatment for Karen required a very cautious trial of stimulant medication for her impairments related to ADHD; she responded well to a very small dose, considerably less than is needed by most adults; this helped to alleviate her ADHD-related impairments significantly. Once her ADHD medications were stabilized, we tried an antidepressant, also in a very small dose, which her very sensitive body chemistry could tolerate. Gradually, that medication helped to reduce her chronic anxiety and depressive symptoms. However, medications alone were not sufficient. More than anything else, Karen needed and made good use of intensive psychotherapy in which she slowly worked through her immobilizing self-criticism and improved her ability to manage aspects of her daily life that for many years had felt unmanageable to her.

One additional aspect of treatment that proved beneficial to Karen was getting both of her sons engaged in treatment for their persisting ADHD. Parents with ADHD often struggle intensely with the challenges of parenting their children, especially if one or more of those children has ADHD. In such situations, adequate treatment for ADHD-related impairments of both the parent and the child or children can be helpful for all.

Case Example: A married couple on the brink of divorce because of the husband's untreated ADHD

Martha, 41 years old, came with her husband for a consultation with me a few days after she had told him that she wanted a divorce to end their 16 years of marriage. She said, "I'm fed up with too much giving and not

enough getting back. I feel like I'm raising not just our two children, but three! My husband, Greg, does a good enough job at work, and he's a good provider, but at home he's just like one of the kids. I have to struggle to get him up and off to work every morning, and I have to remind him to get off the computer every night so he won't stay up playing video games until 2:00 or 3:00 A.M. I've given up on his taking care of our monthly bills because he never pays them on time. We were getting threatening letters and calls from creditors because he forgot to pay. There was enough money in the bank, and he said he would take care of it.

"Once in a while he'll start a project at home, but then he never finishes it. For 2 years, we've had bare two-by-fours in our bedroom where he says he's going to put in new plasterboard. Mostly when he's home, he's on the computer or watching sports on TV. He says he's going to come to the kids' sports events, but then he forgets to show up. When I try to talk with him, he listens for maybe a minute or two, then he's drifting off talking about something else. He's not a heavy drinker and he's not abusive, but he is neglectful. I've been married to him for 16 years, but all that time I've been neglected by this man. He seems to need a mother to take care of him day by day more than he needs or wants a wife."

I expected that Greg would respond to his wife's complaints with anger, but he didn't. He cried. He acknowledged his frequent forgetfulness and frequent neglect of tasks, events, and concerns that were important to his wife and to his children. He then said, "You're right! I make a lot of promises to you and the kids that I don't follow through on. And I do depend on you to keep me organized and to remind me about what needs to be done and when to do it. I've never been good at stuff like that. When I was a kid, all the way through high school, my mother had to hassle me every day to get me up in the morning. If she hadn't, I would have slept through school. I've never been able to get myself up with an alarm clock. And she had to keep pressuring and reminding me to get my homework and chores done. Even though I wanted to, I just couldn't manage that stuff myself. You help me with so much, and you're not even mean about it. I just don't know if I can change the way I've been for so many years. I don't know if it's something that can be changed."

Greg clearly had ADHD that had never been diagnosed or treated. He willingly agreed to try a regimen of medication to alleviate his chronic ADHD problems. After a couple of dosage adjustments, it was quite helpful to him. But that did not fix all the problems in their marriage. We spent several months of weekly sessions together to try to identify specific changes that this couple needed to make to protect their marriage and improve the quality of life for themselves and their children.

The problems of this couple were not limited to Martha's complaints. Gradually, Greg began to air some of his frustrations with her. He re-

sented Martha speaking to him often in condescending tones, as though he were no different from their children. He realized that he sometimes deliberately frustrated Martha by ignoring her requests because he felt she was picking on him too much, undermining his children's respect for him and his respect for himself. Gradually, Greg made changes in how he managed his responsibilities at home, and slowly, Martha made changes in how she dealt with Greg. Together they planned weekly times for the two of them to go out for dinner or a movie. Eventually, they also resumed their sexual life together, an aspect of their marriage that had long been avoided. Both had begun to grow more fully into a mutual adult relationship, rather than a mutual reenactment of Greg's patterns of interacting with his mother when his ADHD had been unrecognized and untreated.

Summary

The new model of ADHD described in this book emphasizes two ways in which emotions are often problematic for persons with ADHD: 1) executive function impairments often impair their ability to modulate emotional expression and 2) working memory impairments often bias their motivations in ways that lead to maladaptive decision making and problematic behaviors as a result of not considering the larger context or likely future consequences.

Examples in this chapter illustrate just a small number of the many ways emotions are entwined in the daily life experiences of not only individuals with ADHD but also other members of their family, classmates, friends, persons they date, persons they marry, and children they care for. Additional examples are provided and discussed in my earlier book, *Smart but Stuck: Emotions in Teens and Adults with ADHD* (Brown 2014). It should be noted, however, that many of these emotional dynamics are not consciously recognized unless those affected are provided assistance in examining the complexity of their emotions, which are often quite subtle and interactive.



Practical Aspects of Medication Treatments for ADHD

ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD) is essentially a problem in the chemical dynamics of the brain, and the most effective treatment for ADHD is usually medication. However, medication for ADHD cures nothing. It is not like an antibiotic that may cure a strep throat. It is more like my eyeglasses. I have a problem with my eyes that makes it hard for me to read typewriter-size print; those letters look totally blurry to me. When I put my eyeglasses on, I can read those letters as well as almost anyone else. When I take my glasses off, I'm right back where I started—unable to read the blurry letters. The eyeglasses do not cure my vision problem, and medications do not cure ADHD.

Although medications do not cure ADHD, for about 8 of 10 people with ADHD, approved medications, properly fine-tuned, can significantly improve their ADHD impairments. For some, the improvement is huge; for others, improvement is not huge, but it is substantial. For some, it helps a little but not very much, and for 2 of 10, the medications customarily used for ADHD either don't work at all or cause side effects that the person should not or does not want to put up with.

How Does Medication for ADHD Work?

In Chapter 6 (“How ADHD Develops, Sometimes Gets Worse, and Sometimes Improves”), I offered a basic description of how messages related to executive functions are communicated within the brain. Here I review that information while providing some additional information relevant to ADHD medications. When they work, medications for ADHD help to improve communication within and between complex networks within the brain that function as the brain’s management system.

This vast and complex system is contained within the brain, an organ that weighs only about 2 and a half pounds and is about the size of a large grapefruit. Within the brain are multiple networks of more than 100 billion neurons, “gray matter,” each of which is only one-millionth of an inch across, visible only with a powerful microscope. Connections between regions of neurons in the brain are provided by networks of “white matter” fibers, which if stretched out from an individual’s brain would be about 150,000–175,000 kilometers long.

For this management system to work, countless messages have to be transmitted via low-voltage electrical impulses that travel at lightning speed from one neuron to another. These neurons do not directly touch each other; there are gaps between their connection points; those gaps are called synapses. When one of these messages reaches a connection point, it must jump that gap like the spark of a spark plug and then hit receptors on the other side of the gap. If enough receptors are hit fast enough, the message goes across and moves on in fractions of a second to the place in the network where it needs to go. If the connection with the receptors at the junction is not sufficient, it quickly fizzles without crossing the junction.

To get across these junctions, the sending neuron needs to quickly release tiny microdots of a chemical made in the neuron. These chemicals are transmitters for the messages. Most of the neurons that control executive functions operate on either dopamine or norepinephrine, two of the more than 50 neurotransmitter chemicals made in the brain. Fractions of a second after the transmitter chemical microdots are released, tiny cells on the sending side of the gap (transporters) work as tiny vacuum cleaners to quickly suck up those chemicals and repackage them so they can be ready to carry new messages across. This transmission process is amazingly fast: in one-thousandth of a second, as many as 12 messages can be carried across the gap.

It should be noted, however, that most of the countless communications that go on within the human brain are not tied to any one single

neuron. Most intrabrain messages are carried by large ensembles of neurons joined transiently to convey related bits of information across networks of countless synapses (Hanson et al. 2012; Nicolelis et al. 1997a, 1997b). Messages arriving at these networks of synapses are not like isolated dots or dashes of Morse code; they are more like cascades of electronic impulses carrying richly variegated tones of complex music generated by multiple instruments.

For persons with ADHD, there are two ways in which the transmission process can be impaired. The sending neurons may not release strong enough signals to hit enough receptors to make an effective connection, or the sending cell's "vacuum cleaner" cells may suck the transmitter chemical back too quickly before adequate connections can be made.

Stimulant medications for ADHD such as methylphenidate and amphetamine do their job at the connection points by slowing the action of the vacuum cleaner cells so the transmitter chemical gets to sit on the receptors just fractions of a second longer, but enough to get a more adequate connection. Some of these medications also cause a slight increase in the amount of transmitter chemical that gets released initially.

The rate and persistence of signaling across the gap to the receptors reflects the importance of that specific message to that person's brain at that moment. This weighting might be compared to the difference between a single knock on a door and repeated knocking on a door to convey urgency or continuing importance of that particular message. Neural messages perceived by the brain as having lower priority—less interesting or less threatening—travel with weaker signals conveyed by a slower rate and less persistence.

The entire process of setting signal strength is incredibly fast, and it is unconscious. Multiple complex networks in the brain, many directly connected to a hub called the amygdala, quickly process and prioritize relevant unconscious, emotion-laden memories from past experiences and previous learning to determine how interesting or threatening any specific perception seems to be to that person in the context of the situation at that moment. This is the brain's "googling," which impacts motivation, as is described in Chapter 5 ("How ADHD Impacts 'Brain Googling' for Motivations").

It appears that persons with ADHD, much of the time but not always, tend to have more difficulty than others in processing the importance of many tasks they are faced with. As is described in Chapter 2 ("A New Model of ADHD"), individuals with ADHD all tend to have a few activities or tasks for which they are able to focus and manage themselves very well, even though for many other tasks and activities of daily life

they are not able to mobilize themselves to focus and function effectively. Medications for ADHD, when they work, help those with ADHD to activate themselves and manage themselves more effectively during that part of the day when the medication is active in their body. While active, medication for ADHD can help to improve communication between neurons in ways that can significantly improve the person's abilities for self-management on a more consistent basis, even for tasks that are not especially interesting or threatening.

Medications approved by the U.S. Food and Drug Administration (FDA) for treatment of ADHD include stimulant medications such as methylphenidate and amphetamine and some other medications that are not stimulants. Methylphenidate has been used for ADHD since the mid-1950s. The ADHD medication best known to most people is Ritalin, which is one brand name for methylphenidate. Other brand names for methylphenidate include Metadate, Concerta, Focalin, and Daytrana. Amphetamines have been available since 1937; they currently include Dexedrine, Adderall, and Vyvanse. Hundreds of peer-reviewed research studies on the use of stimulant medications have been published. Tables 10-1, 10-2, and 10-3 list names and characteristics of currently approved medications for treatment of ADHD and show which are available in immediate-release and/or longer-acting formulations.

Nonstimulant medications include atomoxetine, guanfacine, and clonidine. They are different from the stimulant medications in that they do not act primarily on the dopamine system of the brain. Atomoxetine (brand name Strattera), like the stimulants, is considered a first-line treatment for ADHD. It acts primarily on the norepinephrine system and indirectly on the dopamine system. Atomoxetine is not usually as powerful as the stimulants in improving inattention symptoms, but it sometimes works when stimulant medications are ineffective or cause too many side effects. More than 30 research studies have demonstrated the usefulness of atomoxetine for children, adolescents, and adults not only for ADHD but also for ADHD accompanied by anxiety, tics, and some other comorbid problems. Atomoxetine, unlike the stimulants, is dosed according to the individual's weight, starting with a stipulated small dose and then gradually increasing over several weeks. Often it is 4-6 weeks before it is possible to determine how effective the medication will be for that person.

Other nonstimulant medications currently approved for treatment of ADHD are guanfacine (Intuniv) and clonidine (Kapvay); both are α_2 -adrenergic agonists that act primarily on the norepinephrine system and have been used to reduce excessively high blood pressure in adults. These nonstimulants may be helpful not only for ADHD symptoms but

TABLE 10–1. Amphetamines approved for the treatment of attention-deficit hyperactivity disorder (ADHD)

Duration of action	Trade name, (year FDA approved), formulation	Available strengths (mg)	Usual dosage range (start–maximum) (mg)	Approximate duration of action (hours)	Ages approved for ADHD
Shorter-acting medications	Adderall [G] (1960) Tablet	5, 7.5, 10, 12.5, 15, 20, 30	3–5 years: 2.5 qam to 20 bid 6–17 years: 5 qam to 20 bid 18+: 5 qam to 20 bid	6–8	3+
	Dexedrine (1976) Tablet	5, 10	3–5 years: 2.5 qam to 20 bid 6–16 years: 5 qam to 20 bid	3–5	3–16
	Evekeo (2012) Tablet	5, 10	3–5 years: 2.5 qam to 20 bid 6–16 years: 5 qam to 20 bid	3–5	6–17
	ProCentra [G] (2008) Oral solution	5 mg/5 mL	5–20 bid	3–5	3–16
	Zenzedi (2013) Tablet	2.5, 5, 7.5, 10, 15, 20, 30	3–5 years: 2.5 qam to 20 bid 6–16 years: 5 qam to 20 bid	3–5	3–16
Longer-acting medications	Adderall XR [G] (2001) Capsule	5, 10, 15, 20, 25, 30	6–12 years: 5–30 qam 13–17 years: 10–40 qam 18+: 20–60 qam	8–12	6+

TABLE 10-1. Amphetamines approved for the treatment of attention-deficit hyperactivity disorder (ADHD) (*continued*)

Trade name, (year FDA approved), Duration of action formulation	Available strengths (mg)	Usual dosage range (start–maximum) (mg)	Approximate duration of action (hours)	Ages approved for ADHD
Adzenys XR-ODT (2016) Tablet	3.1, 6.3, 9.4, 12.5, 15.7, 18.8	6–12 years: 6.3–18.8 qam 13–17 years: 6.3–12.5 qam 18+: 12.5–18.8 qam	11–14	6+
Dexedrine Spansule [G] (1976) Capsule	5, 10, 15	5 qam to 20 bid	10–14	6+
Dyanavel XR (2015) Oral solution	2.5 mg/1 mL to 20 mg/8 mL	6–17 years: 2.5–20 qam	10–14	6+
Vyvanse (2007) Capsule	10, 20, 30, 40, 50, 60, 70	30–70 qam	8–12	6–17, adults

Note. FDA = U.S. Food and Drug Administration; G = generic; ODT = orally disintegrating tablet; XR = extended release.

Source. Adapted from Puzantian T, Carlat D. *Medication Fact Book*, 3rd Edition. Newburyport, MA, Carlat Publishing, 2016. Used with permission.

TABLE 10-2. Methylphenidates approved for the treatment of attention-deficit hyperactivity disorder (ADHD)

Duration of action	Trade name, (year FDA approved), formulation	Usual dosage range (start–maximum) (mg)		Approximate duration of action (hours)	Ages approved for ADHD
		Available strengths (mg)			
Shorter-acting medications	Focalin [G] Dexmethylphenidate (2001) Tab (2x potent vs. MPH)	2.5, 5, 10	2.5–10 bid	3–4	6–17
	Methylin CT [G] (2003) Chewable tablet	5, 10, 20	2.5 bid to 20 tid	3–4	6–17, adults
	Methylin [G] (2002) Liquid	5 mg/5 mL; 10 mg/5 mL	2.5 bid to 20 tid	3–4	6–17, adults
	Ritalin [G] (1955) IR tablet	5, 10, 20	2.5 bid to 20 tid	3–4	6–17, adults
	Aptensio XR (2015) Capsule (40% IR, 60% DR)	10, 15, 20, 30, 40, 50, 60	10–60 qam	8–12	6+
Longer-acting medications					

TABLE 10-2. Methylphenidates approved for the treatment of attention-deficit hyperactivity disorder (ADHD) / (continued)

Duration of action	Trade name, (year FDA approved), formulation	Available strengths (mg)	Usual dosage range (start–maximum) (mg)	Approximate duration of action (hours)	Ages approved for ADHD
Longer-acting medications (continued)	Concerta [G] (2000)	18, 27, 36, 54	18–72 qam	10–16	6–12, adults
	Capsule (22% IR, 78% DR)				
	Daytrana Patch (2006)	10, 15, 20, 30	10–30 qam & remove after 9 hours	8–12	6+, adults
	CR transdermal patch				
	Focalin XR [G] Dexmethylphenidate XR (2005)	5, 10, 15, 20, 25, 30, 35, 40	6–17 years: 5–30 qam; 18+ years: 10–40 qam	8–12	6–17, adults
	Capsule (50% IR, 50% DR)				
	Metadate CD [G] (2001)	10, 20, 30, 40, 50, 60	20–60 qam	8–12	6+
	Capsule (30% IR, 70% DR)				
	Methylin ER [G] (2000)	10, 20	20–60 qam	4–8	6+
	Hydrophilic polymer tablet				

TABLE 10–2. Methylphenidates approved for the treatment of attention-deficit hyperactivity disorder (ADHD) (continued)

Duration of action	Trade name, (year FDA approved), formulation	Available strengths (mg)	Usual dosage range (start–maximum) (mg)	Approximate duration of action (hours)	Ages approved for ADHD
Longer-acting medications (continued)	Quilichew ER (2015)	20, 30, 40	20–60 qam	8–12	6+
	Chewable tablet (30% IR, 70% ER)				
	Quilivant XR (2012)	25 mg/5 mL	20–60 qam	8–12	6+
	Liquid (20% IR, 80% ER)				
	Ritalin LA [G] (2002)	10, 20, 30, 40, 50, 60	20–60 qam	8–12	6+
	Capsule (50% IR, 50% DR)				

Note. CR=controlled release; CT=chewable tablet; DR=delayed release; ER=extended release; FDA=U.S. Food and Drug Administration; G=generic; IR=immediate release; LA=long acting; MPH=methylphenidate.

Source. Adapted from Puzantian T, Carlat D: *Medication Fact Book*, 3rd Edition. Newburyport, MA, Carlat Publishing, 2016. Used with permission.

TABLE 10-3. Nonstimulants approved for the treatment of attention-deficit hyperactivity disorder (ADHD)

Class	Trade name (year FDA approved) Formulation	Available strengths (mg)	Usual dosage range (start–maximum)	Approximate duration of action (hours)	Ages approved for ADHD
α_2 -Adrenergic agonist	Intuniv [G] (guanfacine ER) (2009) ER tablet	1, 2, 3, 4	1–4 mg qd. Do not increase faster than 1 mg/week. Adolescents 7 mg qd max.	24	6–17
	Kapvay [G] (clonidine XR) (2009) ER tablet	0.1, 0.2	0.1 mg qhs. Increase by 0.1 mg qd weekly & give divided bid; max 0.4 mg qd.	12–16	6–17
Selective norepineph- rine reuptake inhibitor	Strattera (atomoxetine) (2002) Capsule	10, 18, 25, 40, 60, 80, 100	<70 kg: start 0.5 mg/kg; target 1.2 mg/kg, max 1.4 mg/kg. If >70 kg, 40–100 mg.	24	6–17: max daily dose of 70 mg; 18+: max daily dose of 100 mg

Note. ER = extended release; G = generic; XR = extended release.

Source. Adapted from Puzantian T, Carlat D: *Medication Fact Book*, 3rd Edition. Newburyport, MA, Carlat Publishing, 2016. Used with permission.

also for excessive irritability, aggression, difficulty in falling asleep, and tics (vocal and/or motor). Side effects of these nonstimulant medications may include excessive tiredness, stomachaches, nausea, and vomiting. Usually, but not always, these side effects improve as the person's body becomes accustomed to the medication. Kapvay and Intuniv have both been approved by the FDA for use in combination with stimulants for treatment of ADHD.

Dosing for guanfacine (Intuniv) usually begins with 1 mg given at bedtime, and then, if needed, the dose is increased cautiously, no more than 1 mg at a time, with the individual taking a given dosage for at least 1 week before any increase to a maximum dosage of 4 mg/day. Clonidine (Kapvay) is usually started at 0.1 mg at bedtime and then, if needed, increased to 0.2 mg or a maximum dosage of 0.3 mg/day.

Either methylphenidate or an amphetamine is usually the first choice for treatment. If the first medication is ineffective, then usually the other will be tried. If neither stimulant works or if both cause excessive side effects, the next choice is usually atomoxetine. However, some patients do better starting with atomoxetine if there is reason to believe that the individual may be especially sensitive to stimulants, has a history of tics, has a recent history of stimulant abuse, or has a strong personal preference.

More detailed, but readily understandable, information about medications for ADHD is available in *Straight Talk About Psychiatric Medications for Kids*, 4th Edition (Wilens and Hammerness 2016), and *Stahl's Illustrated Attention Deficit Hyperactivity Disorder* (Stahl and Mignon 2011).

What Influences the Effectiveness of ADHD Medication?

One factor that influences how well medication for ADHD works for a given person is dosing. Many medications can be prescribed simply by age or weight—little children need very small amounts and big people need much larger doses. For stimulants, the medications most often used for ADHD, it does not work that way. Most small children do respond best to very small doses, but there are a few little children with ADHD whose bodies do not respond to the small doses that usually work for children of their size; those few may respond best and without any side effects to the larger doses customarily used for much bigger children or adults.

Likewise, most bigger and heavier people usually respond best to more substantial doses of stimulants. However, there are a few very big

people who respond best to very small doses of stimulants, doses similar to what would usually be given to a preschooler.

Because age and weight are not an adequate guide to what dose of stimulant works best for someone with ADHD, it is usually best to begin with a very minimal dose and then, if there are no significant benefits and no adverse effects, to increase every 3–5 days until a dose is found that is effective without causing undesirable side effects.

This process of adjusting the dose of a stimulant medication is essentially a search for that “sweet spot” between too much and too little. If a person is taking too little medication for ADHD, it is useless; you might just as well be taking breath mints. If you are taking too much stimulant medication you are likely to be feeling too “wired” or jittery, as though you’ve consumed way too much coffee. Or you may be feeling too irritable, much more likely to get angry over little frustrations that would not usually bother you (Arnsten and Li 2005; Arnsten and Pliszka 2011).

Becoming too serious is one additional problem that may be caused by a dose of stimulant that is too high for an individual. Individuals may lose their “sparkle,” their spontaneity, their sense of humor. They may be able to focus well for tasks, but they do not feel much like interacting with others. They do not feel like their regular self.

These side effects that can come from taking a dose of stimulant that is too high for the person are usually very temporary; they generally disappear as the medication wears off later in the day.

Can ADHD Medication Benefit Older Adults?

Although there has been increasing recognition that many adults age 50 or older experience ADHD (Das et al. 2012, 2015; Guldberg-Kjär and Johansson 2015; Michielsen et al. 2015a, 2015b), there is, thus far, little research on the experience of older adults with ADHD medications. Lensing et al. (2015) reported on a study of 149 adults age 50 years or older (average age 55.8 years) who were diagnosed with ADHD at an average age of 50 years. Sixty-one percent of those participants had a child who had been diagnosed with ADHD, and 26% had a grandchild with an ADHD diagnosis.

In the Lensing et al. (2015) sample, 87.9% reported having been treated with medication for ADHD, most with stimulants. Of those who had tried the medications, 36% stopped using the medication, whereas 64% found medications helpful and were currently continuing use. Those currently treated with medication for ADHD reported that their

attention was improved compared with 10 years ago, and they tended to be employed, whereas those who had never taken medication or who had stopped taking medication did not report improved attention and were less likely to be employed. Those who continued taking medication also reported better self-efficacy—better ability to manage their life than those who did not continue medication treatment.

The mean dosages of medications used were 54.1 mg/day for methylphenidate and 29.5 mg/day for amphetamines. A review by Torgersen et al. (2016) concluded that many patients age 50 years or more who had ADHD-related impairments experienced beneficial effects from treatment with ADHD medications. However, Torgersen et al. (2016) emphasized the importance of an adequate physical examination prior to starting such medications in this older population and urged starting with low doses and very gradual titration. It is also important to be alert to possible interactions between ADHD medications and other medications an older patient may be taking for various medical or psychiatric difficulties.

Fitting ADHD Medications to a Person's Schedule

Even if a person is getting a dose of ADHD medication that works well, there is another problem: fitting the medication into the person's daily schedule. Most important is making certain that the medication is not seriously disrupting the person's eating or sleeping. Stimulant medications can significantly reduce a person's appetite. Typically, the medication doesn't change the person's appetite for breakfast. Depending on the specific medication, it can take from 30 minutes to an hour and a half for the effects of the pill to really kick in. However, stimulant medication certainly can reduce a person's appetite for lunch and possibly also for dinner. Usually, this effect wears off within a few days or a few weeks of regular use. Occasionally, reduced appetite continues for more than a few weeks; in that case, some adjustment of dose or timing may resolve the difficulty.

Many people with ADHD have chronic problems falling asleep even prior to taking any medication. For them, ADHD medication taken close to bedtime may help them stop ruminating and focus better on falling asleep. However, for most people taking stimulants, there is need for an interval between when their ADHD medication wears off and when they are able to go to sleep. The necessary interval may be just an hour or it may need to be 4–6 hours after the medication has worn off.

Because of individual differences in how long a particular medication takes to wear off and how much time the patient needs to relax into sleep, the clinician monitoring medication response may need to work with the patient over a few weeks to determine what schedule will work best.

It is not uncommon for anyone taking stimulant medication for the first time to have considerable difficulty falling asleep for the first few days. Usually, this can be prevented by avoiding taking any stimulant, especially a long-acting stimulant, in midafternoon or later. There are many individual differences in how medication may affect sleep. Some people need 2–6 hours or more after their last dose of a stimulant has worn off before they can begin to fall asleep. Others are able to fall asleep readily less than an hour after taking a dose of stimulant.

Many individuals with ADHD report having difficulty not only with getting to sleep but also with awakening. Often parents report that the most difficult part of their day is getting their children with ADHD awake and getting them to complete their morning routine and out the door in time to catch their bus or ride to school each morning. This process is not easy in any household, but for children with ADHD, the process of awakening, getting out of bed, completing morning hygiene, getting dressed, eating breakfast, and gathering homework, books, and belongings to leave for school presents increased challenges due to sluggish awakening, dawdling, forgetfulness, morning irritability, and difficulty keeping track of the passage of time. These processes are typically problematic not only for young children, but also for adolescents and even parents themselves, especially if multiple members of the family have ADHD.

Even if persons with ADHD are taking helpful medications during the day, most ADHD medications, even immediate-release formulations, do not actually kick in quickly enough to be of much help for the morning routine, even when taken immediately on awakening. Some parents attempt to counter these problems by awakening their child with ADHD an hour before he or she actually needs to get up and giving the child a dose of immediate-release stimulant and a sip of water while he or she remains in bed. This can work if the child can get back to sleep for the remaining hour and then awaken after the medication has had a chance to kick in.

Similar problems are faced by college students or other adults living alone who do not have anyone to awaken them at the earlier hour so early medication can help them get themselves up and effectively launched on time for classes or work. Some are able before they go to bed at night to set out their morning dose and a glass of water at their

bedside table and set an alarm clock to awaken them an hour before they need to get up; they set a different alarm clock across the room to awaken them at the time they actually need to get up. However, many individuals with ADHD have chronic difficulty remembering to make these preparations at bedtime.

Many people find that longer-acting stimulants, medications like Vyvanse, Concerta, Adderall XR, Focalin XR, and generic equivalents, work well for them during the day once they kick in. These longer-lasting formulations reduce the need to take multiple doses over the course of the day, and they often have fewer ups and downs in their coverage. However, there is a lot of variability from one person to another in how long the longer-lasting stimulants actually work.

Published estimates claim that some particular long-lasting medications work effectively for 12–14 hours; for other long-lasting medications, estimates are 8–10 hours or 6–8 hours of effectiveness. These estimates are all averages based on trials with carefully selected samples. For some patients, the medication lasts significantly longer than the reported average. For other patients, that same medication may lose effectiveness in less than half of the reported average time.

These differences in duration of action can make a big difference in planning adequate coverage of medication for any given individual patient. For example, our group found that 60% of adolescents and adults being treated with a long-acting stimulant with a reported 10- to 16-hour duration of action needed a booster dose of short-acting stimulant in midafternoon to late afternoon to cover additional hours to successfully manage tasks in late afternoon and early evening.

When considering addition of short-acting medications to extend the duration of action of longer-acting stimulants, it is important for the prescriber to keep in mind that for most longer-acting medications, the potency of the extended dose at any time over the course of the medication's action is only one-half of the face value of the longer-acting formulation. For example, a 20-mg dose of Adderall XR does not provide 20 mg of coverage throughout its duration of action. It provides 10 mg of coverage for the first few hours and then another 10 mg of coverage for the following few hours. In contrast, the immediate-release version of Adderall 10 mg releases the full 10 mg at the outset. This needs to be taken into account when planning combined use of longer-acting and shorter-acting stimulant medications.

Another problem with fitting stimulant medications to an individual's daily schedule is time of onset. Some short-acting stimulants kick in within about 30 minutes after the pill is swallowed. Some longer-acting stimulants produce very few benefits until 60–90 minutes after ingestion.

Here is an example of how these variables may work. A 16-year-old high school student must get up at 6:00 A.M. to catch his bus to school at 6:30 A.M.; his classes start at 7:15 A.M. If he takes a long-acting stimulant at 6:15 A.M., it may not even start to kick in for him each day until 7:45 or 8 A.M. and may not reach optimal strength until an hour or two later. For that student, it works best to take a short-acting stimulant at 6:15 A.M. at the same time as the longer-acting stimulant. The short-acting medication helps the patient as a “jump start,” while the longer-acting capsule gradually launches itself to cover the rest of the school day.

This same 16-year-old student is an athlete who plays on his school’s teams for three seasons: football, basketball, and lacrosse. Throughout the school year, he does not get home from sports practice until about 6:00 or 6:30 P.M. He then showers, eats dinner, and, while tired, faces an average of 2 hours of homework, sometimes more. His ADHD medication for school has lost effectiveness by about 3:00 P.M., leaving him with no coverage for doing his homework. He finds that taking a small booster dose of short-acting stimulant as soon as he gets home, even before showering and eating dinner, gives him the coverage he needs to get his homework done before it wears off, and it does not interfere with getting to sleep.

Many adults with ADHD also have problems getting adequate coverage with their ADHD medications. Some who leave home at 7:00 A.M. to commute to work want to take a long-acting medication so they do not have to remember to take doses several times during the day. Yet a long-acting medication taken at 7:00 A.M. may wear off as early as 1:00 or 2:00 P.M., leaving no coverage for the rest of their workday or their tasks like preparing meals, helping children with doing homework and getting ready for bed, or doing paperwork they need at work the next day.

An adult in this situation might benefit from taking a second dose of the long-acting medication in early afternoon to midafternoon. In this case, the second dose of the long-acting stimulant probably should be a bit lower than the initial morning dose because there is likely to be some residual of the morning dose still active in the body, even if it is not sufficient to maintain adequate symptom control.

How Can Stimulant Medications Be Fine-Tuned for a Specific Person?

Given the individual variabilities in body sensitivity that influence what dose of ADHD medication is likely to be most effective and what timing of dosing is likely to provide the best coverage for the individual’s daily schedule, careful inquiry is necessary to fine-tune for an op-

timally effective medication regimen. The treating clinician needs to take time to ask not just “How is this medicine working for you?” It is necessary to take the time to ask more detailed questions about specific responses and to link these to time of day.

The first thing to ask about and write down is whether the patient has been experiencing any adverse effects, anything that he or she finds uncomfortable or dislikes (e.g., headache, stomachache, difficulties with sleep or appetite). If any are reported, it is important to ask the time of day that a problem was noticed, how long it lasted, and when it went away. Was it greater in the morning, afternoon, or evening? Did the problem stay the same over the course of the day, or did it start and then stop? Did the adverse effect occur only for the first few days of taking the medicine, or did it persist and get better or worse over a series of days?

After inquiring about possible adverse effects, it is time to ask whether any benefits or other changes were noticed. This can be done using a scale from 1 to 10, where 1 indicates that the person was unable to focus and was unable to carry out necessary tasks and where 10 indicates that the person was quite well focused and able to work reasonably well. It is usually helpful to begin by asking how the person would rate himself or herself on that scale if he or she has had no medication. Once that baseline has been obtained, the clinician can inquire about where on the scale the person felt himself or herself to be at various times during the day (e.g., 8:00 A.M., 10:00 A.M., 1:00 P.M., 4:00 P.M., 6:00 P.M., 8:00 P.M.).

When this information is linked with information about what doses of medication were taken at particular times of the day, the clinician can help the patient develop a profile of how quickly the medication kicks in and at what time it seems to lose effectiveness. This can then be compared with information about times of eating and sleeping and what tasks and demands the person has at various points in the day. By integrating these various bits of information, the clinician can tailor a plan to optimize medication dosing to safeguard eating and sleeping schedules and to provide optimal coverage at those times of the day when ADHD medication is most needed.

How Can the Impact of ADHD Medications on Anxiety and Moods Be Assessed?

When assessing effects of ADHD medications on an individual’s functioning, it is important to consider the impact of the medication on the person’s anxiety and moods. Although current DSM-5 (American Psy-

chiatric Association 2013) diagnostic criteria include no mention of problems with emotions as a symptom of ADHD, many individuals with ADHD report that they struggle frequently with excessive anxiety, irritability, depression, or moodiness (Brown 2014).

For some individuals, ADHD medications significantly improve such emotional difficulties. Some individuals who were chronically anxious or irritable prior to any ADHD treatment report that stimulant medication helps them feel more calm and less anxious or irritable than ever before. By strengthening executive functioning, the stimulant may improve “top-down” control of their unsettling emotions.

Posner et al. (2014) reviewed the reported evidence that stimulants may be helpful in reducing emotional lability for children and adults with ADHD. Sinita and Coghill (2014) reported on the emerging consensus that stimulant medications can be helpful in improving emotional dysregulation and lability as well as oppositional and conduct problems often associated with ADHD. They also noted that stimulant medications may improve outcomes in persons with treatment-resistant depression and may reduce negative symptoms and improve cognitive performance in persons with schizophrenia. More research is needed to verify these reports.

However, it is also true that some individuals who take stimulant medications for ADHD experience an initial onset or intensification of anxiety, irritability, or dysthymic feelings that may be related to use of that medication. If so, the clinician should ask for details about how often and when these emotional difficulties occur, whether they arise only intermittently or are more consistent, and at what point in the day they tend to begin and to remit. If such emotional difficulties do not arise during the time the medication is active but do occur as it is wearing off, the emotional reaction may be an aspect of rebound, which is described in a subsequent section of this chapter, “What Is Rebound and How Can You Tell If the Medication Dose Is Too High?”

If the emotional difficulties arise during the period when the medication is active and then improve as it wears off, the problem may be that the dose is too high for that patient at that time. The difficulty may be alleviated by reducing the dose. If dose reduction is helpful without seriously compromising the positive effects of the medication, the reduced dose should be continued. If the dose reduction results in the medication losing its effectiveness for ADHD-related impairments, it may be necessary to discontinue that medication and try an alternative medication.

For example, if the patient experiences significant improvement in ADHD-related impairments when taking a longer-acting stimulant but continues to feel too anxious or irritable taking the dose that works best in reducing symptoms, it may be helpful to reduce the dose of the longer-

acting stimulant and augment with a small dose of shorter-acting stimulant in the morning to help “jump-start” the patient’s functioning while using the reduced dose of the longer-acting stimulant to provide coverage for the remainder of the day. An alternative might be switching from an amphetamine to methylphenidate or vice versa to see if a different form of stimulant will produce adequate results without adverse emotional effects. Other options might be to discontinue the longer-acting formulation and use only immediate-release stimulants on a two-times-daily or three-times-daily regimen; to reduce the dose of stimulant and combine with a small dose of atomoxetine or guanfacine; and to discontinue the stimulant and try a nonstimulant such as atomoxetine (Brown 2004).

Does Stimulant Medication Need to Be Taken on the Same Schedule Every Day?

To be effective, some medications need to be taken daily to maintain a specific medication level in the bloodstream. That is not true of stimulants. Whatever stimulant medication is taken today is pretty much gone from the body by the next day. If a day of medication is missed, it is similar to a day where I do not have my eyeglasses. I simply do not have the beneficial effects of the glasses during that day. Having worn them the previous day does not provide any benefit the following day.

Often students taking medications for ADHD and their parents question whether they should take their stimulants on weekends and school vacations. I usually ask patients to take their stimulants 7 days a week while we are trying to find an effective dose. After an effective dosing regimen has been found, the students and parents can then determine whether they want the medication to be taken every day or to take it only on days when they will be in classes, have homework to do, or have some other activity for which they feel the medication will be helpful.

Sometimes, there will be a reason to minimize medication intake whenever possible. For example, a small number of children and adult patients continue to have significantly diminished appetite while taking stimulant medications, even after they have been taking that medication for many months. If they tend to be underweight, it may be helpful for them to refrain from taking their stimulant medication on any day that it is not needed for school or schoolwork. That may allow them to eat more heartily to compensate for their usually diminished appetite.

I see many high school and college athletes with ADHD. They tend to differ on whether they want to take their ADHD medication to cover the

hours they are engaged in practice or games. About 50% like to take their ADHD medications when playing their sport. It helps them improve their ability to sustain focus and planning while they are playing so they do not experience mind wandering or poor recall of the coach's directions during the game. The remaining 50% prefer not to take their ADHD medication when playing their sport because they feel it causes them to think too much, to hesitate in making their moves as spontaneously as may be needed. The only way I know to decide who should or should not take their medication while playing their sport is to have them try it both ways and then let me know which way seems to work better for them.

What Is Rebound and How Can You Tell If the Medication Dose Is Too High?

There are three signs that suggest the dose of a stimulant medication may be too high. Each of these applies for the time the medication is supposed to be working and then diminishes as the dose wears off: 1) the person feels too "wired," restless, or "revved up" or as if he or she is racing; 2) the person feels much more irritable than usual, annoyed by little frustrations far more than usual; 3) the person is too serious, losing his or her "sparkle" or spontaneity, able to focus well perhaps but not feeling like his or her regular self. If any of these patterns occurs over several days during the time the medication is expected to be active and then diminishes as the medicine wears off, there is a strong probability that the medication dose is too high for that individual or that this is just not a good medication for that person.

However, if the person does not have any of those difficulties during the time the medication is expected to be active and he or she does have one of those problems later in the day when the medication is expected to be wearing off, that is likely to be a rebound. It does not mean the dose is too high because that reaction would have been seen during the time the medication was supposed to be active. Instead, such a response during the hours the medication is expected to be wearing off indicates a rebound.

Rebound is a term used to describe the person's "crashing" as the medication is wearing off. Usually, this means the medication is dropping off too quickly. Often this can be corrected by administering a small booster dose of the short-acting form of that medication about 30 minutes before the rebound has been occurring. This smooths the drop-off curve to create a slower, more gradual decline from the earlier dose. There are two reasons for using a booster dose: 1) to prevent a rebound

of excessive restlessness, irritability, or lack of spontaneity and 2) to extend the duration of the medication's action for a few more hours.

How Can You Tell If an ADHD Medication Is Working Effectively?

If a stimulant medication is working effectively to alleviate ADHD impairments, there should be a noticeable improvement in executive functions (described in Chapter 2) during the time the medication is active. Those improvements would be expected to diminish as the medication wears off, just as vision improvements provided by wearing eyeglasses or contact lenses are lost when the glasses or lenses are removed. Medications do not produce improvements before they kick in, a time period that can be as short as 30 minutes or as long as an hour and a half following ingestion. If a stimulant medication produces noticeable changes at a given dose level and then, a few days or a week later, does not produce those improvements, it is likely that the dose is almost at the right level but not quite there yet. A slight increase in dose should restore the benefits.

Some children and adults are very much aware of when their stimulant medication kicks in and when it wears off. Other patients report that they do not feel any different while the medication is supposed to be working, even though parents, teachers, coworkers, or friends report that they observe quite a noticeable difference while the medication is active. Sometimes patients will report that they do not feel any difference in their mood while the medication is in their bloodstream, but they do notice that they are getting more work done, reading more carefully, or remembering information more easily and consistently than usual. The critical test of the ADHD medication's effectiveness is not so much whether patients feel a dramatic change of mood; the test is whether patients are able to deploy their executive functions more effectively while taking medication than they can without the medication.

What Does It Mean If an ADHD Medication Seems Helpful and Then Loses Effectiveness?

While the dose of an ADHD medication is initially being tried and adjusted, there may be a period of a few days or a week or two when the patient reports or seems to show significant improvement in executive

functions and then soon loses that beneficial response. If that is the case, the most likely explanation is that the dose used during that time was almost—but not quite—at the optimal point for that person. It is as though the novelty of the drug’s effect on the brain wore off, and those networks returned to their usual level of functioning. Often a slight increase in dose will restore the previously noticed effectiveness.

If a person has been taking an ADHD medication for a longer time—months or years—and then notices that the medication has gradually lost its earlier effectiveness, there may be a need to increase the dose a bit to see if that will restore effectiveness. This may become necessary because the person is under more stress than usual, is encountering more challenges than previously, is not getting enough sleep, is in a growth spurt, is fighting an infection, or is taking an additional drug that interferes with the ADHD medication (e.g., using too much marijuana), or other changes in the body or daily life may be altering the threshold of efficacy. However, it is important to inquire into possible factors that may be producing the change before escalating the dose. Some other intervention may be more helpful. However, it is also true that occasionally, for some patients, a medication may simply lose its effectiveness after a period of prolonged benefit for no identifiable reason. This type of unexplained “poop out” can occur with almost any type of medication, including antidepressants, antihistamines, and many other medications unrelated to ADHD. In such situations, it is sometimes necessary to try a different ADHD medication, which might work more effectively. If after a “vacation” from the earlier medication it is restarted, effectiveness may return.

It should also be noted, however, that sometimes an ADHD medication that has been effective for a fairly long time at a stable dose may begin to cause the person to feel uncomfortably restless or much too focused or too irritable over many days without any apparent reason. Sometimes what is needed in that situation is a slight reduction of the dose. This is not uncommon among children or adolescents, who sometimes need a smaller dose of medication as they get older.

Is a Generic Version of an ADHD Medication Less Effective?

Many generic formulations of medications work just as well for most people as do the more expensive brand-name medications. FDA rules require that the generic’s maximum concentration of the active drug ingredient in the blood must not fall more than 20% below or increase more than 25% above that of the brand-name drug it is expected to replace (Dunne et al. 2013; Eban 2013).

For many users, such a 20%–25% variance makes no difference in the effectiveness of the medication. However, for some users, that difference could substantially reduce effectiveness or increase side effects. Unfortunately, patients do not come with labels to indicate who will or will not be affected by such a difference.

There are also other factors, not included in the FDA regulations, that may affect how the generic formulation affects a person compared with the brand-name drug. There may be differences in how quickly or slowly the medication is released. There may also be differences in nonactive components such as the ingredients in the packing inside the pill or its coating. All of these factors may impact some users of the medication.

In 2016, there were three different pharmaceutical companies producing and selling pills identified as generic equivalents of Concerta (Thomas 2015). The FDA found that the products being sold by two of those companies were not equivalent to brand-name Concerta. The agency instructed those two manufacturers to improve their product or take it off the market. For many months, neither of those actions were taken, and many patients complained that the “Concerta” they had been taking had suddenly lost effectiveness or was causing unprecedented side effects. Often those patients or their parents were not even aware that a generic medication had been substituted. Even if they became aware of the problem, many did not know how to find out which brand of generic their pharmacy was using to fill their prescription or when a change from one generic version to another had been made by the pharmacy in the pharmacy’s efforts to obtain the most advantageous price for itself.

If a medication for ADHD (or anything else) seems suddenly to have lost its effectiveness, the patient should notify the clinician and also check with his or her pharmacy to ask whether a generic medication was substituted for the drug or whether a different brand of generic is now being used to fill the prescription. Sometimes one pharmacy in a community is buying and using one generic version of a particular drug, while another pharmacy is utilizing a generic produced by a different manufacturer that may be more or less effective for any given patient.

What Are the Risks of Drinking Alcohol While Taking ADHD Medications?

To avoid the risks of drinking alcohol while taking ADHD medications, the best advice is to avoid consuming alcohol while an ADHD medication is in your bloodstream. Sometimes people deliberately take stimu-

lant medication while drinking alcohol because they feel it will keep them more alert while partying. The problem with this is that the stimulant medication is likely to make it more difficult for a person to recognize when he or she has had too much alcohol or is getting too tired and needs to stop. This can lead to excessive drinking, which can put a person at risk of not only an intense hangover but also more serious problems due to impaired judgment or high-risk behavior or possible alcohol poisoning, which can be fatal.

Many who take stimulant medications early in the day will refrain from taking any more stimulant in the afternoon or evening; they will drink only a moderate amount of alcohol later in the evening when the level of stimulant in their bloodstream is reduced. However, given the wide variations in how quickly or slowly various individuals clear stimulants out of their bloodstream, anyone using ADHD medication who wants to drink alcohol should discuss this with his or her clinician to get personalized advice that also includes consideration of any other medications the individual may be taking that could complicate his or her reaction to alcohol.

Many different kinds of medications can significantly alter how alcohol affects a person's body. While in the bloodstream, medications used for anxiety, depression, sleep, pain, and other problems can potentiate the effects of drinking alcohol. Depending on the level of the specific medication in the bloodstream at the time, one drink can double or triple the bodily effects of any alcohol-containing drink without the drinker realizing what is happening. Many medications when combined with alcohol can also cause cardiovascular difficulties, which can range from mild to serious. The National Institute on Drug Abuse has published a booklet that describes what types of medications can cause such problems (National Institute on Alcohol Abuse and Alcoholism 2003).

How Does Using Marijuana Affect a Person Who Is Taking ADHD Medications?

Marijuana provides relaxation for many people, but depending on the strength of the tetrahydrocannabinol (THC) and the amount taken in, it can also substantially intensify ADHD impairments of executive function such as alertness, getting started on tasks, sustaining focus, and utilizing working memory.

Marijuana can also block the useful effects of ADHD medications, especially if one is smoking or otherwise consuming it in significant quantities on a regular basis. This is true not only during the period the individual feels high. Depending on how much is consumed and how frequently, some effects of THC persist much longer. Because THC is stored in fat cells, it is excreted slowly from the body over days or weeks; some effects of THC persist and become chronic if frequent use is continued. One of the major problems of heavier or very frequent use is that the person gradually tends to not give a damn about many things he or she really does need to give a damn about.

Does a Person Taking an ADHD Medication Need to Take It for His or Her Life?

Almost anyone taking medication for ADHD can stop it at any time. Only if a person has been abusing the medication by taking extremely large doses, or dosing with excessive frequency, or consuming much more than would ever be appropriately prescribed over a prolonged period is there significant likelihood of becoming addicted and having trouble stopping the medication. Otherwise, for most people, stopping ADHD medication is like stopping the wearing of eyeglasses. People are likely to notice the loss of the benefits of the medication, especially over the first week or two, but then they are most likely to return to the baseline of functioning they had before starting the medication.

However, there are some individuals who are particularly vulnerable to addiction who escalate their dosing pattern and become tolerant to very high doses of stimulant, more than would usually be prescribed. Any person who has a history of stimulant abuse should be carefully evaluated and may do best on a nonstimulant medication for ADHD or on a very limited and closely monitored regimen of longer-acting stimulants, such as Vyvanse, which have less potential for abuse than shorter-acting stimulants.

Some persons take medication for their ADHD for just several months or a couple of years and then do not need it anymore. This does not mean that the medication has cured their ADHD-related impairments. It may be that their continuing brain development has progressed enough to manage executive functions more effectively without needing the medication anymore. Or it may mean that the person no longer needs the level of improvement in executive functions that the

medication provided. For example, some who needed medication for their ADHD while in school may not need it after they are out of school and engaged in activities that fit better with their natural interests, perhaps a job that excites and interests them, or when they no longer are required to do work that involves reading, writing, or other tasks that are more challenging to their native abilities, or if they have a secretary or other assistant who takes care of tasks for which they have little interest or facility.

What Evidence Is There That Stimulant Medications Improve Symptoms of ADHD?

Stimulant medications have been used to treat ADHD symptoms for decades. There is a very large body of research that has tested the effectiveness of these medications. Three main types of research have been reported:

- Imaging studies to observe changes in brain functioning and connectivity when a person with ADHD is taking medication or a placebo
- Structured experiments on specific ADHD-related functions in which one group of children or adults with ADHD was tested doing a specific task while taking medication compared with a matched group tested on the same task while taking placebo
- Clinical trials that tested whether children or adults carefully diagnosed with ADHD show reduced severity of the symptoms of ADHD while taking a particular medication when compared with a matched group of others with ADHD who are taking a placebo or a different ADHD medication

Imaging studies have demonstrated improvement in activation of specific brain regions that are not functioning effectively in children or adults with ADHD (Epstein et al. 2007; Konrad et al. 2007; Pliszka et al. 2007). Other imaging studies have shown improvement in activation of attention and motivational control brain networks (Rubia et al. 2009; Volkow et al. 2004) and normalization of brain circuits that prevent excessive distractibility (Rubia et al. 2011). Additional studies demonstrated improved functional connectivity for working memory of individuals taking stimulant medication (Wong and Stevens 2012) in brain circuits that help to suppress excessive distractibility (Peterson et

al. 2009) and in dopamine signaling to reduce inattention, hyperactivity, and impulsivity (Volkow et al. 2012).

Experimental studies have shown that while taking stimulant medication, children with ADHD showed improved classroom behavior (Abikoff and Gittelman 1985). Other studies showed that boys with ADHD worked more quickly and efficiently on arithmetic problems (Carlson et al. 1991) and that they were more willing to keep trying on frustrating tasks when taking medication (Milich et al. 1991). Children taking medication also showed improved visual-spatial memory (Bedard et al. 2004), improved ability to inhibit themselves on a stop-signal task (Bedard et al. 2003), and improved motivation to perform well on a variety of executive function tasks (Chelonis et al. 2011).

A systematic meta-analysis review of 23 double-blind, placebo-controlled studies of stimulant medication used with children and adolescents found very positive results across the sample groups (Faraone and Buitelaar 2010). The data analysis indicated robust, statistically significant effects for all stimulant medication treatments assessed.

A similar meta-analysis of effect sizes for 18 published studies of stimulant and nonstimulant medication treatment of adults with ADHD found similarly high levels of effectiveness for stimulants and lower effect sizes for treatment with nonstimulants (Faraone and Glatt 2010). A study that compared effectiveness of stimulant versus nonstimulant medications for ADHD in youths also found that stimulants had very high levels of effectiveness, whereas nonstimulant medications were also effective but not with such a high margin as stimulants (Faraone et al. 2006b). However, it is important to keep in mind that these comparisons are based on the data of group averages. Within such groups, there are likely to be many who respond equally well to either type of ADHD medication, and some who respond better to nonstimulants than to stimulants.

What Risks Are Involved in Using Approved Stimulant Medications for ADHD Treatment?

No medication is without some risks. No one can ever promise that any particular medication given to any specific person is 100% guaranteed to have no adverse effects. Some medications, even widely used medications such as antibiotics used to treat infections or analgesics used to treat fever or headaches, can be associated with serious, potentially fatal adverse reactions in a very small number of persons who take them.

Such reactions are extremely rare and generally occur only in individuals whose health is seriously impaired, but they do occasionally occur. However, when medications are administered within accepted guidelines to basically healthy individuals, adverse effects from medications approved for treatment of ADHD involve relatively few risks.

The active ingredients of most medications currently approved to treat ADHD have been in use for decades by very large numbers of children, adolescents, and adults. Amphetamine has been available since the 1930s, and methylphenidate was introduced in the 1950s. The first reports of the beneficial effects of amphetamine on learning and behavior of children were provided in 1937 by Bradley (1937), who discovered these benefits accidentally in his research with emotionally and behaviorally disturbed children.

Initially, these medications were widely used by adults as a treatment for depression and to induce weight loss. They were officially issued to and used by the American, British, German, and Japanese soldiers, sailors, and airplane crews during the Second World War and are still officially issued to some pilots in the U.S. Air Force to help them stay alert on long flights.

Both methylphenidate and amphetamines are controlled by the U.S. government and most other governments in the same way opiate pain medications are controlled; this is because, when misused, they have the potential for abuse when administered in excessive doses or when administered in other than oral modalities. In the 1940s, there were numerous reports of stimulants being abused as treatments for weight loss. That is no longer considered an appropriate use of stimulants.

The common side effects of stimulants are not persistent or dangerous. It is not unusual for patients starting these medications to report some difficulty with headache, stomachache, reduced appetite, and/or falling asleep (Aagaard and Hansen 2011). Generally, such reactions are not severe, tend to be quite transient, and usually respond to adjustment of dose and/or timing. Some adverse reactions occurred because the starting dose prescribed was too high for that individual. As mentioned in the section "What Influences the Effectiveness of ADHD Medication?" there is wide variation among patients in all age groups regarding what dose is likely to be the most effective.

Those considering use of ADHD medication for their children or themselves are often concerned about the potential for more serious adverse effects such as heart attack or stroke, growth delays, or the possibility of the child eventually becoming addicted to the ADHD medication or later getting addicted to some illicit drug. Research has addressed each of those concerns.

A number of studies have investigated large samples of children and adults to determine whether use of medications for ADHD might increase an individual's risk of heart attack, stroke, or other serious cardiovascular problems. Studies have compared samples of thousands to several hundreds of thousands of children from preschool through adolescence who were treated with ADHD medications with children who were never treated with such medications (Cooper et al. 2011; Olfson et al. 2012). Results provided no evidence for increased risk of cardiovascular problems among those treated with ADHD medications. Another study of more than 400,000 adults found that ADHD medications were not associated with any increased risk of cardiovascular problems in adults if taken as prescribed (Habel et al. 2011).

Some parents worry that treatment of their child with stimulant medications is likely to stunt their child's growth. A longitudinal study followed into early adulthood a group of children taking stimulant medication for ADHD and a matched group of children who did not have ADHD. Most of the children taking medication were treated with the medication for about 8 years. Results showed no evidence that stimulant medication was associated with any deficits in growth outcomes at follow-up in adulthood (Biederman et al. 2010b).

However, there is some evidence from a review of studies that some, not most, children taking medication for ADHD are slightly delayed in reaching their full height (Faraone et al. 2008; Swanson et al. 2007a, 2007b). Most of those delays are minor and transient, involving differences of 1 centimeter or less, relative to predicted height for age, differences that almost always disappear in later childhood or adolescence. Nevertheless, monitoring of growth in height and weight should be done while any child or adolescent is being treated with medication for ADHD. If a child or teenager is exceptionally small for his or her age, possible reasons for the delay should be investigated, and consideration should be given to modification of the treatment plan.

Many parents, aware that stimulant medications are controlled by the government to prevent abuse, worry that if their child is treated with stimulants, that medication might cause him or her in adolescence or later to become addicted to stimulants or to some illicit drug. Actually, the risk of a child with ADHD eventually developing a substance use disorder is significantly greater than for others of similar age if that child is not treated with medication for ADHD than when the child receives ADHD medication treatment (Charach et al. 2011; Wilens et al. 2011). Treatment with stimulant medication seems to have a protective effect against adolescent substance abuse. It does not guarantee that the child

will never become addicted to alcohol or another drug, but it tends to reduce that risk to a level comparable to that for children without ADHD.

In considering any medical treatment for any disorder, the important question is, Are the risks of using this treatment for the diagnosed problem greater or less than the risks of not using the treatment? As described in Chapter 4 (“Ways ADHD Can Impair Functioning at Various Age Levels”) and other parts of this book, the risks associated with ADHD are often quite substantial and may increase with age:

- Preschoolers with significant ADHD are more likely to get injured (Dalsgaard et al. 2015a), to have more difficulty in getting along with peers and family members, and to have trouble mastering basic skills that most others of the same age are learning.
- School-age children with ADHD are likely to have more difficulty in learning academic skills for reading, writing, and math, in getting homework done, in keeping track of belongings, and in developing and maintaining friendships with others of comparable age.
- Adolescents with ADHD are more likely to struggle with schoolwork and less likely to graduate from high school, less likely to manage their sleep and health adequately, more likely to engage in risky behaviors including illicit drug use and risky driving, and less likely to develop and execute a realistic plan for after high school and beyond.
- Young adults with ADHD are less likely to complete their education/training to prepare for a career, less likely to find and maintain employment for an adequate income, more likely to struggle with managing money, and less likely to develop and sustain satisfying relationships with friends and potential partners.
- Adults with ADHD are less likely to sustain employment to provide ongoing support for self and any dependents, less likely to develop satisfying relationships with friends and/or a partner, less likely to be able to provide adequate care and resources for any children, and less likely to manage health care and insurance for self and dependents.

Medication treatment for ADHD is certainly not a guarantee that an individual with ADHD will not experience some of these difficulties due to impairments of executive function, but for many, though not all, carefully managed medication treatment may significantly reduce the risks that untreated or inadequately treated ADHD is likely to involve.

Summary

This chapter begins with the assertion that ADHD is essentially a problem of the chemical dynamics of the brain and that the most effective treatment for ADHD is usually medication. A description of how these medications work in the brain is provided. It is noted that medication does not cure ADHD, although for about 80% of children, adolescents, and adults, approved medication, properly fine-tuned, can alleviate their ADHD impairments during the hours it is active. Tables list characteristics and usual dosages of medications currently approved by the FDA for treatment of ADHD.

The bulk of the chapter then presents practical information on factors that may influence the effectiveness of medications for ADHD for various individuals: how a medication regimen can be tailored to a given individual, how various side effects can be addressed, how to tell if a dose is too high, how to assess whether a medication is working for a specific person, and how a clinician should respond if a medication seems to lose its effectiveness. Answers to a number of other questions that are frequently asked by clinicians and patients are also provided. The chapter concludes with a summary of scientific research on the risks and benefits of medications for ADHD.



Practical Aspects of Nonmedication Interventions for ADHD

IN THIS CHAPTER, I PRESENT A WIDE VARIETY of nonmedication interventions for the treatment of persons with attention-deficit/hyperactivity (ADHD). Education and guidance for parents and the processes of collaboration and accommodation in educational settings are explored. Sections on supportive therapy and individual ADHD coaching are included along with both print and online resources that persons with ADHD and their families, partners, and friends can access to understand and grapple with the symptoms of this disorder.

Education of Patients and Families About ADHD and Its Treatments

One of the most helpful and important interventions for patients who have ADHD and for their families is providing them understandable and accurate education about ADHD—what it is and what it isn't. Very

few of the individuals who seek consultation or evaluation for ADHD are without some understanding of the disorder. Their information may be quite extensive and accurate; it may be partially correct but not clearly understood; or it may be grossly inaccurate, although strongly believed. Before trying to give anyone new information about ADHD, it is important to get some idea of what the person already knows, or thinks he or she knows, and how willing he or she is to take in new information about ADHD.

Some patients have obtained information from Web sites, conferences, books, or magazine articles or from their physicians or other medical or mental health providers. Others have learned about ADHD by observing or talking with family members, friends, or others who are successfully or unsuccessfully living with ADHD. Sometimes the information the person has obtained is richly detailed and quite accurate. Sometimes it is quite anecdotal and impressionistic. However, many individuals come with very limited information or grossly mistaken assumptions about ADHD.

It is important for the clinician and other mental health professionals who seek to help the person with ADHD to begin by finding out and taking into account what the person already knows or believes about ADHD. In our clinic, this begins at the outset of the initial evaluation. We start by asking why the patient or parents decided to come at this particular time rather than earlier or sometime later. We invite a description of what specific problems have been noticed, how long they have been going on, and what has already been done to try to address the problems. Usually, we do not try to correct misunderstandings about ADHD at this point. The initial task is to learn what the patient and family are concerned about and what they are hoping the consultation will do for them.

Later in the interview, after sufficient background and history information has been gathered, we take some time to explain that many changes have occurred in our understanding of ADHD over recent years, based on facts that have been learned from recent scientific research. As is detailed in Chapter 8 ("Assessing Children, Teenagers, and Adults for ADHD"), we then describe our understanding of ADHD using the six-factor model presented in Chapter 2 ("A New Model of ADHD"). In doing this, we try to use many brief examples of typical problems of individuals with ADHD similar to those included in Chapter 2. This is not a lengthy lecture, but an interactive conversation. After each section of the model has been briefly described, we stop and ask the patient and family to tell us how much the description and examples we have just offered fit or do not fit the experiences of this particular pa-

tient. This approach is designed not only to describe the new model of ADHD but also to function as a way to gather more information about the degree of fit between current difficulties of this particular patient and the current scientific understanding of ADHD and/or other disorders.

In concluding an initial consultation, we generally offer the patient and family a brief oral summary of our impressions from what we have learned. This includes an indication of whether the patient's presentation actually does or does not meet diagnostic criteria for ADHD and/or any other co-occurring problems that seem important. We also try to highlight the specific strengths of the patient that may have helped him or her to cope with the ADHD impairments. We also acknowledge any specific stressors in past and/or present that have complicated or impeded the patient's efforts to deal with ADHD. In doing this, we often use the circles inside squares graphic organizer (Brown 2005b), which is available on my Web site (www.DrThomasEBrown.com). We then invite questions from the patient and any family members. This leads to a brief description of "where to from here" options for follow-up; these may include treatment, further evaluation, or neither. We also provide an opportunity for the patient and family to raise and get answers to any additional questions or concerns they may have.

Education about ADHD should not be limited to the initial consultation. We usually provide each new patient with a packet of written information to take home. The packet includes some fact sheets and articles about ADHD and its treatment. We encourage patients to get back in touch with us if they have additional questions or concerns after completing the interview. Often patients will want to schedule a follow-up appointment as we conclude the initial consultation.

Some patients come to their initial consultation after having tried some medications for ADHD. If so, during the clinical interview we will discuss with them what they see as the benefits and/or problems associated with medications they are currently taking or have taken in the past. This discussion may lead to our making suggestions for them to take back to their prescriber or an offer to be available to consult with their prescriber if they wish. To facilitate this process, we provide the patients with a packet of written materials about ADHD and their evaluation data to take to their prescriber for follow-up.

If the patient has ADHD and is not currently taking any prescribed medication for ADHD and is interested in a trial of medication, we usually offer to provide a brief note to be taken to the patient's primary care provider or referring clinician. That note briefly summarizes the evaluation findings and suggests that the patient be given a physical exami-

nation to identify or rule out any medical problems that might impact the choice of treatment plan, particularly the possible use of medication. If the patient wishes, we also offer a recommendation for a specific ADHD medication that seems likely to be most helpful. The patient can give this suggestion to his or her referring clinician or to his or her primary care provider along with our offer to collaborate with that clinician in developing and monitoring a treatment plan for the patient's ADHD if that is agreeable to the clinician and the patient.

Most of our patients diagnosed with ADHD choose to return to us to collaborate in designing and monitoring their treatment for ADHD. For some, this involves just a few additional visits, after which they are followed by other providers with the option to return to the clinic for further consultation if needed. Others engage in more intensive and sustained treatment in our clinic for their ADHD and any related disorders that concern them.

Some other patients, for various reasons, do not want to engage in any kind of treatment for their ADHD in response to their initial consultation. In such cases, we offer the patients written information and assure them that they are welcome to return at any time if they have further questions or want to reopen discussion of possible treatment options.

Guidance for Parents

If the patient is a child or adolescent, it is important for parents to have access not only to scientifically accurate information about ADHD. They also need, and usually ask for, guidance about how they can best help their son or daughter with ADHD to function more effectively in school, in peer interactions, and within the family.

Some of the issues parents most often ask about are listed below:

- *Is medication for ADHD safe for our child, and if so, what medication is likely to work best? What side effects may occur, and how can you tell if the medication is working? What monitoring do we need to do, and how often should we meet with the clinician?*

It is important for the clinician to take sufficient time to address worries of parents about whether the suggested medication may have harmful effects. If such concerns are not adequately expressed and addressed, parents' fears may lead them to avoid giving the prescribed medication to their child or to discontinue use of the medica-

tion precipitously because of unwarranted fears. It is also important for parents to have information about how they can tell if the medication is working effectively. For example, if a child is taking a medication in the morning that wears off soon after or perhaps even before the end of the school day, parents may hear from teachers that the medication is helpful to their child, yet they may see little change or even increased difficulties after school because the medication has worn off or is causing rebound symptoms. For this reason, it is often helpful for the medication to be started on a weekend, when the parents have more opportunity to observe the child's responses to the medication at various times of day.

Another important fact to communicate prior to starting a new medication is that it takes time to determine an effective medication and dose for any specific individual. Parents and patients need to know, as is described in Chapter 10 ("Practical Aspects of Medication Treatments for ADHD"), that the optimal dose of a stimulant is not directly correlated with the patient's age, weight, or symptom severity; it depends on the individual's body sensitivity to that particular medication. Titration is the search for the "sweet spot" between too little medication and too much. They also need to know that sometimes the medication initially chosen may not be effective or may produce side effects that require not just a change of dose but also, possibly, a change to another medication.

It is also helpful to schedule the child and at least one parent to return for a follow-up visit with the clinician after the child has been taking the medication for a couple of weeks. Parents also appreciate being invited to e-mail or telephone the clinician if they have any concerns about the medication's effects that they want to discuss before the return visit. If the medication prescribed is a nonstimulant or another class of medication, such as an antidepressant, that requires 4–6 weeks before any benefits can be observed, it is important for parents and the patient to have that information before beginning the medication trial. Wilens and Hammerness (2016) have written a very helpful book, *Straight Talk About Psychiatric Medications for Kids*, now in its 4th edition, for parents who want understandable information about various medications used for ADHD and related problems in children.

- *How can we resolve differences of opinion between us, his parents, about the best ways to make decisions, not only about medication but also about how to deal with our child's behavior in ways that are not too harsh and not too lenient?*

Medication treatment for ADHD in children depends on the continuing and consistent support of parents and/or other caretakers to obtain, dispense, monitor, and refill the medication. The clinician should explicitly inquire about whether there are significant differences of opinion between parents about the use of medication for their child's ADHD. If these are present, the clinician should try to learn about the specific concerns felt by each and try to sort out a mutually agreeable resolution. Sometimes such differences are based on one parent's not being adequately informed about ADHD and the basic facts about the medication. In other situations, there may be subtle or overt conflicts between the parents that are based not on the facts of ADHD and its treatment but on persisting disagreements about other, perhaps more deep-seated, conflicts between them. When such differences become apparent, these should be clarified and sorted out by the clinician with the parents.

Parents also may differ on their attitudes about how to respond to their son's or daughter's behavior in school or at home. As is described in Chapter 9 ("Emotional Dynamics in Individuals, Couples, and Families Coping With ADHD"), if not recognized and constructively dealt with by the clinician, such parental conflicts can sabotage the child's treatment and exacerbate family stress. Some parents find the following books helpful for understanding and managing ADHD problems in their children:

- Barkley RA: *Taking Charge of ADHD: The Complete Authoritative Guide for Parents*, 3rd Edition. New York, Guilford, 2013
- Barkley RA, Benton CM: *Your Defiant Child: 8 Steps to Better Behavior*, 2nd Edition. New York, Guilford, 2013
- Barkley RA, Robin AL: *Your Defiant Teen: 10 Steps to Resolve Conflict and Rebuild Your Relationship*, 2nd Edition. New York, Guilford, 2013
- Dawson P, Guare R: *Smart but Scattered: The Revolutionary Executive Skills Approach to Helping Kids Reach Their Potential*. New York, Guilford, 2013
- Nadeau KG, Littman EB, Quinn PO: *Understanding Girls With ADHD: How They Feel and Why They Do What They Do*, 2nd Edition. Washington, DC, Advantage Books, 2015
- Phelan TW: *1-2-3 Magic: Effective Discipline for Children 2–12*, 3rd Edition. Glen Ellyn, IL, ParentMagic, 2003
- *How can we protect our child from becoming demoralized about having ADHD? How can we set and maintain reasonable expectations to encourage good effort in school and in carrying out respon-*

sibilities at home? We don't want ADHD to become an excuse for laziness or unacceptable behavior.

The best way to protect a child from becoming demoralized about having ADHD is for the child's parents to have a good understanding of what ADHD is and what it isn't so they can help their child to gradually develop an accurate and constructive attitude about ADHD. It is not easy to maintain a reasonable balance between understanding that the child with ADHD is experiencing some difficulties that, despite appearances to the contrary, are not willful and are not under voluntary control, and at the same time supporting the child and requiring that he or she make the best possible use of his or her strengths and the supports available. These difficulties are discussed in several of the case examples in Chapter 9.

- *What should we tell the school? Should we be asking teachers to make changes in how they deal with our son or daughter? If he or she is labeled as having ADHD, will that lead to being embarrassed and treated as "different" by teachers and peers?*

Usually, though not always, a student being evaluated for ADHD has been having significant difficulties in school. Frequently, the ADHD evaluation has been, in large part, sparked by those difficulties. Sometimes the problems are behavioral, sometimes they are academic, and often they are both. For students in elementary or secondary school, the evaluation usually involves seeking information from teachers about the strengths and difficulties of the student in school functioning. Once an evaluation has been completed, if the student has been found to have ADHD, it is usually a good idea for the parents to discuss the diagnosis with the student's primary teacher. It is important for parents to be aware that increasing numbers of teachers are well informed about ADHD and can offer valuable help in planning ways to help students with ADHD to improve their functioning in school. However, it is also important for parents to know that although all experienced teachers have had experience in dealing with students with ADHD, many are not aware of current understandings of ADHD, and some, lacking adequate training in this area, hold negative attitudes about the diagnosis and are unaware of best practices for dealing with those students.

After learning that their child has been diagnosed with ADHD, parents should inquire of the teacher or principal about what the school's usual policies are for supporting and accommodating students with ADHD. Information about possible supports and accom-

modations for ADHD in school can be found later in this chapter. The main point here is that parents should find out about the policies and attitudes about ADHD held by teachers and administrators in their child's school and then seek to collaborate with school staff to plan for minimizing negative effects and optimizing their child's learning and behavior in light of the ADHD diagnosis. It is also important for parents to keep in mind that there are necessary limits to how much any given teacher and school can or should accommodate to the needs and desires of any one student and his family. If parents find that some of their child's teachers do not have up-to-date information about ADHD, they may want to print and provide copies of the article "ADHD: From Stereotype to Science," a piece written by the author of this book that was published in *Educational Leadership* (Brown 2016), a national magazine for teachers. A copy can be found at my Web site (www.DrThomasEBrown.com).

- *One of us parents probably has ADHD and has never been treated for it. Should we get evaluation and treatment for this? Would that help our child?*

As mentioned in Chapter 1 ("Basic Facts and the Central Mystery of ADHD"), ADHD is highly heritable, and about 25% of persons diagnosed with ADHD have a parent with ADHD. In many cases, the parents are not aware of their ADHD until they bring their child to a clinic for evaluation and learn about the symptoms and impact of this disorder. At that point, many parents are quick to recognize that one or both of them endured similar difficulties at a comparable age. In some cases, the parent has outgrown those ADHD symptoms and is functioning well, but in many cases, that parent is still struggling in adult life with impairments of ADHD.

If the parent currently has significant problems with ADHD symptoms, it is usually a good idea for that parent to seek evaluation to determine whether there is sufficient current impairment to warrant an ADHD diagnosis and to begin appropriate treatment. There is some evidence that parents with current and untreated ADHD impairments are less effective in supporting the treatment and development of their child with ADHD. If the parent had ADHD earlier but has now outgrown or adequately compensated for the ADHD-related impairments, that parent should be able to provide especially empathic support for his or her child with ADHD, so long as he or she realizes that the child's experience of ADHD may be quite different from the parent's own earlier experiences.

- *How can we provide the help that our child with ADHD needs at home without being unfair to our other sons and daughters?*

Often a child with ADHD needs a disproportionate share of attention and support from his or her parents, particularly during the earlier years. This can create understandable frustrations and conflicts within or between the parents and within the whole family system. Siblings are likely to develop subtle or very explicit jealousy and resentments over why their brother or sister with ADHD seems to be getting more parental time and attention, more privileges, or more lenient treatment than other children in the family. Even if parents are very careful to be consistent in rewards and punishments and to balance their time and privileges for each of their children, there are often subtle but difficult burdens experienced by siblings of children who have significant impairments from ADHD and/or other disorders. Jeanne Safer (2003) has written sensitively about the burdens of being “the normal one” in a family with a difficult sibling.

- *Does our child need some kind of counseling or therapy to deal with his or her ADHD and/or related problems? If so, where can we find the right help?*

When parents discover that their child has a significantly impairing disorder, especially if they have overlooked or misinterpreted that problem for some time, they are likely to want to do everything possible to address that problem immediately in multiple ways. That may be a mistake. First, it is usually not easy to find adequate professional help for ADHD, particularly if it is complicated by anxiety, depression, substance abuse, a specific learning disorder, or other co-occurring problems. Second, suddenly pushing a child (or anyone else) to see and be evaluated and treated by a variety of different clinicians for any problem is likely to generate a “something very serious is wrong with me” feeling. Deciding on a treatment approach usually works best if there is one clinician who serves as case manager to help parents identify what interventions are likely to be helpful to their child and to figure out what is actually necessary and available. For some persons with ADHD, particularly adolescents and adults, it may be very helpful to have some conversations or psychotherapy with a knowledgeable and empathic clinician about how their ADHD has impacted them and what practical steps they might take to improve some of their difficulties. For others, particularly younger children, it may be best for the consultations to be provided primarily to the parents so they can be an ongoing source of support as their child is learning to deal with ADHD.

- *Is our child's ADHD likely to get better or worse as time goes on? What does this mean for his or her future education, relationships, and career?*

It is certainly very understandable that parents want to know how ADHD is likely to have an impact on their son or daughter, but there is no crystal ball to provide a credible answer to that seemingly simple question. There are too many complex factors that influence outcome. In Chapter 6 (“How ADHD Develops, Sometimes Gets Worse, and Sometimes Improves”), I describe how ADHD sometimes improves and sometimes gets worse over time. Processes of brain development that may have been delayed may then catch up a little or a lot. The nature of the home, school, and community environment can make a significant difference in how much the child with ADHD feels safe, accepted, and supported or harshly criticized, bullied, or rejected.

Having or lacking supportive parents and other relatives, teachers, friends, and mentors can make a huge difference. A child with striking personality characteristics and social skills or one who has exceptional cognitive, athletic, artistic, or musical talents may compensate very well for ADHD impairments. Some children with ADHD are quite resilient and have extraordinary persistence in making strong efforts to overcome challenges that they face. Some are fortunate and enjoy good health, whereas others struggle with multiple health problems, often without adequate resources to obtain effective treatment. Life is not always fair.

However, despite these multiple factors that may influence development of an individual with ADHD for worse or for better, it is important for parents to know that there are many persons with ADHD who eventually do very well in their education and who are quite successful in completing their schooling and developing a successful career and satisfying relationships with friends, family, a partner, and offspring.

Collaboration With Elementary and Secondary Schools

When a child in preschool, elementary school, or secondary school is being evaluated for possible ADHD, it is important to obtain information about how that student is functioning academically and socially in school. Parents can supply useful information about what they notice

about their child's attitudes, comments, and behavior with respect to going to school, relating to teachers, interacting with classmates, and doing homework. They can also share copies of report cards, notes sent home by teachers, reports of standardized testing, and other records. Parents will also have considerable anecdotal information about their child's school experience that is not available to the child's teachers.

Teachers can also provide information that is not directly available to parents. Especially in lower grades, where the student is with just one teacher for most of the day, the teacher has a wealth of information about how each child interacts with him or her and how the student responds to various types of assignments—what learning comes easily and what is more challenging, how the student listens and follows directions, and how much the student needs to be reminded to persist in working on an assigned task. The teacher also can report on how the child interacts with classmates during organized group activities, while working with partners or small groups, and in unstructured free time or play situations. Most important, the teacher is able to observe the student's behavior relative to that of a group of other children of similar age.

Most parents have only very limited opportunities to observe their son or daughter with a diverse group of children of similar age. Teachers, especially those who have been teaching a particular grade level for more than just a couple of years, have had sustained opportunity to witness a large sample of students of a given age in a wide variety of situations. Their perspective can be quite helpful, especially when parents lack experience with many children of their child's present age. Teachers are generally more aware of the wide range of normal development in the age groups with which they work.

Teachers of students in secondary school can provide helpful information about their students, but their perspective is generally more limited than that of elementary school teachers because most secondary school teachers have many more students each day and much less opportunity to observe those students in diverse activities. A typical high school teacher has five classes each day, each of which may include 25 or more students. He or she may become well acquainted with some of the students who are more active class participants or who seek conversation after class, but high school teachers do not have much opportunity to interact personally and really get to know many of the students who are in and out of their classroom each day.

Teachers also vary in their ability and willingness to observe and describe their students. Some teachers are extremely perceptive in dealing with their students. They notice fluctuations in their students' moods and energy levels and their degrees of interest and motivation for vari-

ous tasks and types of learning. They watch how students interact with one another and notice subtle changes in the dynamics of friendships and alliances and conflicts between subgroups. Some teachers function as trusted, empathic advisors for particular students, whereas they may be seen by other students as harsh critics or overbearing managers or menacing adversaries.

There are also differences among teachers in their willingness to share information with inquiring parents. In some schools, there is an administrative climate that urges teachers to be very cautious in telling parents anything about their son's or daughter's performance that might be taken by the parents as overly harsh or critical. Those teachers may be instructed to limit their reports to parents to just factual recitation of grades on assignments or very limited description of behavior, without any elaboration as to what the teacher has noticed about the student's attitude, social interactions, or more subtle aspects of his or her functioning in school.

Most school districts have a policy that forbids teachers from suggesting that a student may have ADHD, a learning disability, or any other specific problem. Such policies have been put in place because some teachers in the past have told parents that their child has ADHD and insisted that the child be prescribed medication, seriously overstepping the boundaries of their training and competence. Yet, in some schools, that caution against suggesting a diagnosis has been interpreted as a requirement to refrain from making even such statements as "Your child seems to have much more difficulty in focusing than most others of similar age. You might want to consider asking your pediatrician about that."

The usual way for most clinicians to solicit information about the school functioning of a student being evaluated for ADHD or related problems is to obtain copies of recent report cards from the parents and to provide parents with rating scales they can take to teachers to request specific information relevant to the evaluation. Many pediatricians use the Vanderbilt ADHD Diagnostic Parent Rating Scale (National Institute for Children's Health Quality and American Academy of Pediatrics 2011) for this purpose. Schools and specialist clinicians more often use other scales for teachers such as the Behavior Assessment System for Children—Third Edition (BASC-3; Reynolds and Kamphaus 2015), Behavior Rating Inventory of Executive Function (Gioia et al. 2000), Brown Attention Deficit Disorder Scales (Brown 2001), Comprehensive Executive Function Inventory (Naglieri and Goldstein 2013), or Conners ADHD Rating Scales—3 (Conners 2008a); these rating scales are normed and elicit more comprehensive information relevant to current understanding of ADHD.

If information from teachers or parents suggests that the student being evaluated might have a specific learning disorder involving impairment in reading, written expression, or mathematics, there is reason to have individualized psychoeducational testing done to inform the diagnosis and treatment planning. Sometimes this testing can be done by the school and shared with the evaluating clinician. If not, it may be possible to arrange private testing, which can then be shared with the school.

In the United States, there are two levels of federal laws that provide for students with disabilities who may need accommodations and/or supports that are not provided for most students:

- Section 504 of the Rehabilitation Act of 1973 (P.L. 93-112) established requirements for accommodations and support for individuals with a disability, including ADHD or a specific learning disability, when such accommodations are needed for them to get an appropriate education. A Section 504 plan, or a 504 plan as it is also referred to, is usually utilized when the student with a disability such as ADHD needs accommodations and/or supports that can be provided within mainstream classrooms and does not need special education services.
- The Individuals with Disabilities Education Improvement Act of 2004 (IDEA) (P.L. 108-446) and the IDEA amendments of 2006 (P.L. 94-142) are the most recent versions of laws first passed by Congress in 1975. This law and amendments provide detailed regulations to ensure that students with disabilities who need special education and related services are provided a free and appropriate education.

When a parent requests services for their child with a disability such as ADHD or a specific learning disability, the school is required to convene within 45 days a meeting that usually involves the parents, one or more of the student's current teachers, the school psychologist, a special education teacher, the school nurse, and the principal or another designated administrator of that school. At that meeting, the parent's concerns are heard and the school staff members present updated information on the student's educational history, current functioning, and other relevant background information. At the meeting, it is determined what further action may be needed; this may include arranging for psychoeducational testing or other specialist assessments.

Among the actions might be development of a 504 plan. This plan provides supports and accommodations for a student with an identified disability (e.g., ADHD, learning disability) that can be implemented

within the mainstream classroom without need for special education services. The following are among the possible accommodations:

- Extended time for completing timed tests or examinations (usually 1.5 of the usual time)
- Reduction in the amount of written work required or extended time for completion
- Daily teacher verification that the student has correctly recorded assignments
- Alternative seating of the student in the classroom (e.g., closer to teacher)
- Use of a calculator for math or computer for written work
- More frequent reports from school to home, possibly including daily report forms
- Behavioral interventions such as a point system to reinforce good behavior

Accommodations and supports provided in a 504 plan are based on agreement between the parents and the school for the current school year. Usually, the 504 plan is reviewed, and revised if needed, at least once each year.

Extended time for taking tests and exams is the most frequently requested accommodation among students with ADHD and/or other learning problems. Although some students with ADHD tend to rush too quickly as they take tests, as though the goal is to finish as quickly as possible, many, though not all, students with ADHD need to work slowly and have great difficulty in demonstrating what they have learned when they are tested under tight time limits. Often they need to reread passages of text repeatedly to fully grasp what is being said and what the exam question is asking. (For information on how extended time can improve reading comprehension on tests for students with ADHD, see Brown et al. 2011b, which is also available at my Web site, www.DrThomasEBrown.com/.) On math tests, persons with ADHD often need more than the usual time to go back and check their calculations so they can correct careless errors or possible misunderstanding of the problem due to their not paying enough attention to details. Likewise, many with ADHD need extended time for tests that require written expression. They may have good ideas about what to write and what information to provide, but many have difficulty in organizing their information and in translating their thoughts into sentences and paragraphs.

When extra time for taking exams is needed by a student because of his or her ADHD or some related disability, a 504 plan can authorize this

extra time, ordinarily 1.5 of the usual time, for tests and exams given in the local school system, including state-mandated exams. However, a 504 plan or individualized education plan (IEP) does not, in itself, provide accommodations for students taking national exams used for college applications such as the SAT or the American College Testing (ACT) exam.

Accommodations such as extended time for the SAT and/or ACT are not obtained simply by having a 504 plan or an IEP. These national exams require a detailed report documenting the nature of the student's disability with evidence from school reports, standardized testing (usually including a full IQ test), academic achievement testing, and a clinical evaluation done by a qualified professional such as a clinical psychologist or neuropsychologist who is familiar with requirements for such accommodations. This report has to be submitted with a specific application for accommodations, in addition to the usual application for taking the exam.

An application for accommodations must be submitted to the SAT and/or ACT office at least 6 weeks prior to the date the student hopes to take the exam. Representatives of the SAT or ACT then review the report to see if it meets requirements that are published on their Web site. If so, extended time is granted. If not, the reviewer will deny the request and notify the student as to what additional information would be required for accommodations to be granted. If a request for accommodations is denied, the student may get the decision reversed if additional assessment data or other information required by the ACT or SAT reviewers is provided in an appeal submission.

For students with identified disabilities whose needs cannot be met adequately with just a 504 plan, the school is required by federal law to convene a planning and placement team (PPT) meeting, where it will be initially determined what additional assessments are needed for adequate planning. Once those data are obtained, the school develops an IEP, which stipulates the nature of the student's disability and provides guidance for needed services, such as remedial instruction, speech/language or occupational therapy services, and/or accommodations such as extended time for tests. The IEP identifies specific objectives and goals for intervention, identifies professionals to provide needed interventions, and specifies the frequency and amount of time for each intervention to be provided.

Usually, those accommodations and interventions can be provided by special education teachers or other specialists located within the school; if not, visits from additional specialists needed may be arranged. It is required by law that these plans be reviewed at least annually and

that appropriate retesting be done in preparation for the triennial review after the program has been in place for 3 years. The school is required to provide to parents a copy of the written IEP and detailed written minutes of each PPT meeting. If parents and local school staff are not able to reach agreement regarding the IEP, the parents have the option to request an appeal meeting with the central administration of the school system.

In some cases, a child's needs cannot be met adequately with the resources of the local school system. In that event, the PPT may determine that placement in a more specialized program outside the local school system is necessary to provide that student with an adequate education. In such cases, the school system is obligated to pay whatever costs are required for that placement and to monitor the student's progress in that placement. It should be noted that the school's obligation under law is to provide the student a free and appropriate education, not an optimal or ideal education. Sometimes parents who are anxious to provide the best possible resources for their child forget that the school system has limited resources with which to provide an appropriate education for all the students in that school system.

If parents have placed their son or daughter in an independent private or religious school, unless that school receives federal funds, it is not under any legal obligation to follow federal laws regarding accommodations and supports under Section 504 of the Rehabilitation Act of 1973 (P.L. 93-112) or the Individuals with Disabilities Education Improvement Act of 2004. Sometimes such schools cooperate in providing such services and accommodations, but they are not legally required to do so. Parents may request that the school district in which the independent school is located provide needed assessment and services if their child has a documented disability.

Parents who want to seek help from the school that their child is attending may want to get additional information or resources for themselves or to share with teachers or school administrators. The Web site www.Understood.org has a lot of readily understandable information in English and in Spanish about how parents can help their children who suffer from attention and learning issues. Russell Barkley (2016) has published *Managing ADHD in School: The Best Evidence-Based Methods for Teachers*, which offers many practical suggestions about how teachers can help students deal with ADHD-related executive function problems in the classroom. A good guidebook for elementary school teachers is Sandra Rief's (2005) *How to Reach and Teach Children With ADD/ADHD: Practical Techniques, Strategies, and Interventions*. Chris A. Zeigler Dendy (in press) has authored an excellent and practical book

for parents and teachers of secondary school students: *Teenagers With ADD, ADHD & Executive Function Deficits: A Guide for Parents and Professionals*.

Accommodations in College and Postgraduate Settings

For students with ADHD or related difficulties who enroll in postsecondary schooling, the college or university has no obligation to provide accommodations or support services unless the student notifies the school and provides appropriate documentation. Many schools will accept a high school 504 plan or IEP, or the reports used to obtain accommodations on the SAT or ACT, as sufficient evidence of the student's need for accommodations. However, some students who demonstrated no need for accommodations in high school find they do need accommodations to deal with the more challenging requirements of college. Those accommodations may include extended time for exams, a minimally distracting setting for taking tests, or a peer note-taker whose notes from a lecture can help to compensate for the student's difficulty in rapidly taking notes during class. If the student has had no accommodations in elementary or high school, usually the college will require a report similar to what is usually required for the SAT or ACT.

Some college students find that they need accommodations for ADHD in the latter years of their undergraduate studies even though they did not apply for or feel a need for any accommodations previously. This may be due to not having recognized and been diagnosed with ADHD earlier, or they may feel need for accommodations because of increased demands for executive functions in meeting requirements for more advanced courses. Some other university students with ADHD may discover that they need accommodations for examinations such as the GMAT, LSAT, or MCAT to gain admission to graduate-level programs. Graduate students with ADHD may need accommodations for taking exams such as the United States Medical Licensing Examination, law boards, or other exams required for entrance into practice of their profession.

For those who are applying for test-taking accommodations for the first time relatively late in their education, it is important to ensure that the person administering the required standardized tests also includes in the report an adequate explanation of why accommodations are being sought now when they were not sought in earlier years of schooling. Some of the organizations offering such accommodations are exces-

sively stringent in enforcing their requirements for accommodations. For example, in 2015 the board that administers the LSAT was presented by a federal court with an order to modify their stringent policies that blocked many applicants from getting needed accommodations for that exam.

Most colleges and universities now provide learning support services such as a writing center, where any student can seek assistance for preparing term papers or other writing assignments, or academic coaching to help students in planning and organizing their work. However, unlike support services in elementary and secondary schools, where students are required to show up for designated services and are confronted and may be disciplined if they do not show up when scheduled, support services in college do not require students to show up for assistance and do not seek out a student who has signed up for support services and then not kept appointments.

Most colleges and universities also have mental health or counseling services where students struggling with academic demands, social difficulties, anxiety or depression, substance use, sleep problems, or other impairments can obtain assistance from a counselor. However, these services usually require the student to take the initiative to seek an appointment and to follow up. Moreover, many of these services are quite limited in staff resources and need to limit the number of sessions for any given student unless there is a very serious problem.

The transition from high school to college involves major changes for students, especially during their first year. Usually, students spend many years in relatively stable school placements where they are familiar with expectations and know their status and routines in classroom and community while continuing to live with their own family. For many, going off to college means giving up their familiar community settings and having to adjust to new friends and a new community. In their new surroundings, they cannot initially know what to expect, and they may struggle with uncertainties about how much they will like and be liked by other students and about how they will fare academically in their new setting and new level of study. Many also worry quite a bit about how their siblings and family will get along without them and how they will be able to cope without the daily support and familiar routines to which they have become accustomed. *A Bird's-Eye View of Life With ADHD and EFD... Ten Years Later: Advice From Young Survivors, 3rd Edition*, by Chris A. Zeigler Dendy and Alex Zeigler (2010); *AD/HD and the College Student: The Everything Guide to Your Most Urgent Questions* by Patricia Quinn (2012); and *Smart but Stuck: Emotions in Teens and Adults With ADHD* by Thomas E. Brown (2014) are books many college

students and some parents have found helpful. Detailed legal information pertaining to higher education is provided in Peter S. Latham and Patricia H. Latham's (2007) book, *Learning Disabilities/ADHD and the Law in Higher Education and Employment*.

Accommodations and Legal Protections for Those With ADHD in Employment Settings

Some adults with ADHD need accommodations in their work setting to help compensate for their impairments of executive function. The Rehabilitation Act of 1973 (P.L. 93-112), Section 504, and the Americans with Disabilities Act of 1990 prohibit discrimination in employment by private employers, state and local governments, employment agencies, and labor management committees. Under provisions of these laws, individuals with ADHD or learning disabilities that significantly impair them, relative to the average person, in important life activities are to be protected from discrimination in job recruitment, hiring, job assignments, pay, layoff, firing, training, promotions, benefits, and leave. Information about when and how employees with ADHD should consider seeking accommodations under provisions of the Americans with Disabilities Act is provided in Kathleen Nadeau's (2016) *The ADHD Guide to Career Success: Harness Your Strengths, Manage Your Challenges*, whereas more detailed information about laws related to employees with learning disabilities or ADHD is available in the book by Latham and Latham (2007) cited earlier.

Supportive Psychotherapy for Young, Middle-Aged, and Older Adults

After receiving a diagnosis of ADHD, many young and older adults have three concurrent feelings. One important feeling is relief that there is a name and a reason for many of the problems they have struggled with and felt ashamed of for a long time. Another significant feeling is hope that available treatments will be helpful in alleviating many of those problems. A third common feeling is anger and resentment that these problems were not recognized and treated long ago. They wonder how different—how much better—their lives might have been if they had been diagnosed and treated much earlier.

For some persons, it is important to talk with the clinician about these feelings and others that arise in response to receiving an ADHD diagnosis. For some, there is an excitement and optimism and new hope for changing their current life situation and their educational, employment, social, and family's future. Others need to discuss and grieve a bit over what might have been had the diagnosis and treatment come earlier. One of my patients expressed this by repeating the line spoken by Marlon Brando in the movie *On the Waterfront*: "I could have been a contender!"

Other patients become overly excited and impatient, wanting to get started immediately with medication treatment from which they are expecting dramatic, life-changing benefits. For these patients, it is important that the clinician help them understand that the treatments are not magical, that they do not fix all of one's problems, and that the search for an effective medication may not be quick and immediately successful. Sometimes the process is frustrating and involves trying various doses or encountering unwanted side effects or inconsistent results. It is important that the clinician help the patient to be realistic about expectations and to recognize that we clinicians cannot promise results that will fully match the patient's longing and needs.

Another area for which adults diagnosed with ADHD often need supportive psychotherapy is dealing with co-occurring disorders. As described in Chapter 7 ("How and Why Other Disorders Often Co-occur With ADHD"), most adults (and many children) diagnosed with ADHD also have one or more other learning, emotional, or behavioral disorders at some point in their lives. Some have struggled significantly with sleep and awakening, depression, anxiety, a learning disorder, obsessive-compulsive disorder, autism, substance use disorders, or other problems for which they may or may not have been diagnosed and treated prior to their evaluation for ADHD.

After receiving a diagnosis of ADHD, they may struggle to figure out how much of those earlier struggles might have been an aspect of their previously undiagnosed ADHD and how much those difficulties were or are still a significant problem for them in addition to their ADHD. Such questions are important, but often they require further evaluation, which may have an impact on the person's treatment for ADHD. For example, some have struggled for many years with feeling excessively anxious or suffer from mood problems. They may have been and may currently be taking medications for those previously diagnosed disorders. Medication started for their ADHD may exacerbate those previous problems or may help to alleviate them. The clinician should explicitly discuss with the patient at the time of initial evaluation

any co-occurring problems that are reported or noticed. That discussion should include consideration of how treatment for ADHD might complicate or be complicated by other disorders present and/or any current treatments for any other disorders. Moreover, the clinician should be alert to the possibility that some co-occurring problems, which the patient did not recognize or did not feel ready to report, may emerge and need to be dealt with in subsequent sessions.

It is not only co-occurring psychological/psychiatric problems that may complicate a patient's functioning and treatment. Medical problems also need to be considered. Does this person have a history of or current difficulties with blood pressure, thyroid, growth delay, migraines, diabetes, heart irregularities, obstructive sleep apnea, allergies, or other medical problems that may complicate his or her ADHD or where medications used for treatment of the ADHD may cause difficulties? Before medication treatment for ADHD is initiated, the patient should have a consultation with his or her primary care provider and get a physical examination to determine whether there are any health problems or any medications currently being taken that would complicate or possibly be a contraindication to receiving medication treatment for ADHD.

One additional concern with which an adult recently diagnosed with ADHD may want some help is dealing with the reactions of family, employers, friends, or others to this new diagnosis. Some adult patients meet with skepticism from a parent, spouse, or dating partner or among friends when they disclose that they have been diagnosed with ADHD. Others in the patient's life may not believe that ADHD is a legitimate diagnosis, may be convinced that the patient could fix all his or her difficulties by simply trying harder, or may be worried that taking medications for ADHD is likely to cause adverse effects or addiction. Many patients are quite comfortable in addressing such concerns, but some worry about how they can convince those persons important to them that their ADHD diagnosis is reasonable and that the treatment being undertaken is safe and likely to be helpful. It is important also to recognize that some patients project onto others negative aspects of their own worries or ambivalence about the diagnosis and/or treatment. It may be the patient who needs additional information and reassurance. A well-informed clinician can be quite helpful in addressing such difficulties if time is allocated for such conversation.

Adults who want more information about ADHD may also benefit from consulting the Web site of the National Resource Center on ADHD (<http://www.chadd.org/NRC.aspx>) operated by Children and Adults with Attention-Deficit/Hyperactivity Disorder (CHADD) with support

from the U.S. Centers for Disease Control and Prevention. In addition to its Web site, the center offers a free newsletter about ADHD and a telephone helpline to answer questions with science-based information about the disorder. Adults may also find useful information from looking at *Attention* or *ADDitude*, two magazines that often provide helpful, updated information for and about persons with ADHD. Books that may prove useful include the following:

- Brown TE: *Attention Deficit Disorder: The Unfocused Mind in Children and Adults*. New Haven, CT, Yale University Press, 2005
- Brown TE: *A New Understanding of ADHD in Children and Adults: Executive Function Impairments*. New York, Routledge, 2013
- Brown TE: *Smart but Stuck: Emotions in Teens and Adults With ADHD*. New York, Jossey-Bass, 2014
- Hallowell EM, Ratey JJ: *Driven to Distraction: Recognizing and Coping With Attention-Deficit Disorder*. New York, Random House Digital, 2011
- Hinshaw SP, Ellison K: *ADHD: What Everyone Needs to Know*. New York, Oxford University Press, 2016
- Solden S: *Women With Attention Deficit Disorder: Embrace Your Differences and Transform Your Life*. Nevada City, CA, Underwood Books, 2012
- Tuckman A: *More Attention, Less Deficit: Success Strategies for Adults With ADHD*. Plantation, FL, Specialty Press, 2009

Cognitive-Behavioral Therapy

Although medication is usually the most effective treatment for ADHD, many individuals continue to struggle with executive function impairments in daily life that are not adequately alleviated by medication alone. For many of these individuals, especially adolescents and adults, cognitive-behavioral therapy (CBT) can be very effective, especially when used in conjunction with adequately fine-tuned medication treatment and when provided by a clinician who has learned to adapt traditional cognitive-behavioral methods to treatment for ADHD.

CBT is quite different from many traditional forms of psychotherapy. It focuses on specific assumptions or thoughts that lead to and reinforce problematic behaviors, but it is concerned with not only those assumptions and thoughts but also the resulting problematic behaviors. Its focus is cognitive *and* behavioral—how one thinks about and interprets events of daily life—and how those often-unrecognized thoughts and interpretations can interfere with managing many aspects of daily life.

For example, a cognitive-behavioral approach might challenge a person who has given up on trying to find a suitable dating partner (“I have ADHD, and there is just no one I would ever want to date who would be available for me”). That therapist might help the discouraged patient to recognize that ADHD does not need to be an impediment to forming relationships and that there may be some desirable dating partners out there, to think about specific actions that might increase the chances of meeting one, and then to actually try to engage in those actions. Patient and therapist would then follow up to collaborate about how those actions could be made more effective.

A similar approach might be taken to other emotionally loaded assumptions common among persons with ADHD, such as the following: “I can never get a term paper or a report in on time.” “I’m just no good at managing money; I always spend too much and then don’t have enough money to pay my bills.”

The Adult ADHD Tool Kit: Using CBT to Facilitate Coping Inside and Out and Cognitive-Behavioral Therapy for Adult ADHD: An Integrative Psychosocial and Medical Approach, 2nd Edition, both written by J. Russell Ramsay and Anthony Rostain (Ramsay and Rostain 2015a, 2015b), provide a very practical description with many examples of how cognitive-behavioral methods can be adapted for adults with ADHD and integrated into a comprehensive treatment program with medication. Another useful book is *Cognitive-Behavioral Therapy for Adult ADHD: Targeting Executive Dysfunction* by Mary Solanto (2013). It describes a systematic program that can be used in group settings or individual sessions to help adults with ADHD improve executive functions such as organization and time management.

Couple Therapy for Adults

Often persons with ADHD have difficulty in relationships with dating partners or spouses. The partner often becomes frustrated with the person’s being chronically inattentive, distracted during conversations, impulsive in making decisions, unreliable in showing up on time or in carrying out responsibilities he or she agreed to take on, or volatile in expressing emotion. Such difficulties can lead to chronic escalation of frustrations and repeated arguments that resolve nothing and leave both parties feeling hurt, resentful, and misunderstood in ways that can undermine and, in some cases, totally disrupt the relationship.

Many of the conflicts experienced in relationships involving one or both partners having ADHD are not unique to relationships involving

ADHD. Developing a relationship in which two people, each with a different personality and a different history of life experiences, are learning to know and become intimate with each other, especially if one or both want to maintain long-term commitment with the other, is a complex and dynamic process that inevitably involves conflict. Differences arise over how to spend time or money, when to go to bed, how to deal with relatives, and countless decisions ranging from trivial matters to major life decisions. Yet when one or both persons in the relationship have ADHD, the executive function impairments of ADHD are likely to further complicate an already complicated process.

Providing therapy for any couple is a complicated task; it is even more complicated in couples when one or both have ADHD. The most basic task is to create and maintain an environment in which both parties can feel safe and protected from the intense embarrassment and hurt that can result when the vulnerabilities of one partner are exposed and verbally attacked by the one person who has intimate knowledge of a partner. The impulsivity, emotional volatility, and inattention to details of a current situation that sometimes characterize those with ADHD can substantially escalate the challenge of doing conjoint therapy with a couple when one or both have ADHD.

Yet, as difficult as conjoint therapy sessions with a couple can be, such sessions are often the most effective way to address conflicts between intimate partners. Even when sincerely trying to tell the whole truth, any individual is likely to present an account of interactions with his or her partner that is biased, if not grossly distorted, by his or her own assumptions and limited recall. There is always some other side to the story. Often a conjoint therapy session can provide the only place where a therapist has the opportunity to understand each partner's recall of, reactions to, and assumptions about the couple's shared experiences. And the conjoint session may also be the only place where each partner can hear and actually listen to the concerns of the other with some empathy. Resources to guide a therapist in this process have been provided by Gina Pera and Arthur Robin (2016) in their *Adult ADHD-Focused Couple Therapy: Clinical Interventions*. Books that may be helpful to partners trying to think about the role of ADHD in their intimate relationships include Melissa Orlov's (2010) *The ADD Effect on Marriage: Understand and Rebuild Your Relationship in Six Steps*; Gina Pera's (2008) *Is It You, Me, or Adult A.D.D.? Stopping the Roller Coaster When Someone You Love Has Attention Deficit Disorder*; and *Married to Distraction: Restoring Intimacy and Strengthening Your Marriage in an Age of Interruption* by Edward Hallowell, Sue George Hallowell, and Melissa Orlov (Hallowell et al. 2010).

Coaching for ADHD

Another resource for individuals with ADHD who are struggling to make changes in their daily life is *individual coaching*. An ADHD coach is a person who has been trained to understand ADHD and the variety of ways in which it affects individuals and who has learned various strategies and techniques to help and monitor those with ADHD who are engaged in the often frustrating and bewildering task of trying to change unproductive patterns of ADHD-related attitudes and behaviors.

For many years, there was no certification process for ADHD coaches; anyone could announce himself or herself as an ADHD coach and charge fees for providing services to persons who wanted to hire him or her. Typically, ADHD coaches are not licensed medical or mental health professionals. Often they are adults who themselves have ADHD and have sought training so they can provide advice and emotional support, face-to-face and/or by phone, to others who might benefit from their experienced perspective. They usually focus on helping their clients with strengthening organizational skills, prioritizing tasks, reducing procrastination, improving interpersonal skills, self-monitoring, and improving self-esteem.

A number of organizations now offer training opportunities and various levels of certification for ADHD coaches. In the United States, these include the ADD Coach Academy (<http://addca.com/>), JST Coaching & Training (www.jstcoaching.com/), Coach Approach for Organizers (<http://coachapproachfororganizers.com>), and FastTrack Coach Academy (<http://fasttrackcoachacademy.com>). The Edge Foundation (<https://edgefoundation.org>) trains and provides coaches to work on-site with middle school, high school, and college students who need support for improving their executive functions; this national foundation offers services for fees and scholarships for students who need coaching support but cannot afford to pay for those services.

Alternative Treatments for ADHD

In addition to the nonmedication treatments for ADHD described earlier in this chapter, there are a number of other nonmedication alternative treatments, many of which are advertised on the Internet and in various publications. Often these ads include enthusiastic testimonials from people who have used the method being advertised. Sometimes advertising includes claims that these methods have been “developed by neuroscientists” or “demonstrated to improve memory or other symptoms of ADHD.”

A group of 21 respected European scientists who specialize in ADHD research conducted a systematic review and meta-analysis of published research studies on dietary and psychological treatments for ADHD (Sonuga-Barke et al. 2013). Their study included restricted elimination diets, artificial food color exclusions, free fatty acid supplementation, cognitive training, neurofeedback, and behavioral interventions. Only studies that included a control group for comparison and did not include using medication for ADHD during the trial were considered. A total of 2,904 published reports were evaluated, but only 129 articles adequately met the scientific standards for inclusion in the study.

The review showed that many of the included studies found positive results when effectiveness was rated by persons who had been actively involved in providing the treatment and knew whether individuals in the study had or had not been receiving the treatment. Results were much less positive when effectiveness of the intervention was evaluated by persons who were blind to who had received the treatment and who had not. For example, if parents had been involved in having their child follow a diet that eliminated food coloring or required that the child do a lengthy series of training sessions on a computer program over many weeks, ratings provided by those parents tended to be quite positive. But when the persons rating effectiveness of the intervention were teachers or research technicians who did not know which participants had received the intervention and which had not, the results were much less positive and generally were not statistically significant.

In short, this extensive study found that unbiased reporters who had no stake in the evaluation did not report significant benefits from these interventions. Parents or clinicians who had a stake in the outcome, and who had put their time, efforts, and/or money into providing the treatment, tended to report much more positive outcomes. Such biased reports do not meet scientific criteria for evidence of effectiveness. A more recent study did a meta-analysis of cognitive training for ADHD and also found very limited effectiveness demonstrated in blinded studies (Cortese et al. 2015).

Four respected American psychologists (Rapport et al. 2013) published a meta-analytic study that focused specifically on commercially marketed computer training programs designed to train working memory, other executive functions, and attention in children with ADHD. They analyzed data from 25 published research studies on these computer training programs to determine what evidence has been provided to demonstrate their effectiveness in improving working memory and related ADHD executive functions. The study looked at how well the training programs produced improvements in tasks similar to those

practiced in the computer training (near transfer). It also examined whether the training produced any improvements in other functions and behaviors that are related to the functions the programs claim to improve (far transfer) both in the short run and over the longer term. Results found that claims made regarding the benefits of these computer training programs, including improved academic achievement, cognitive improvements, and reduced ADHD symptoms, are not supported by empirical evidence at this time. A similar study of seven research papers evaluating the Cogmed Working Memory Training program reported very similar results; Chacko et al. (2013) concluded that working memory training programs such as Cogmed cannot be considered a viable treatment for youths with ADHD at this time.

An overview assessment of nonmedication treatments for ADHD was published by two respected American ADHD researchers (Faraone and Antshel 2014). They applied the strict criteria for identifying evidence-based treatments in medicine developed by the University of Oxford's Centre for Evidence-Based Medicine to determine the strength of the evidence and the magnitude of treatment effects for ADHD medications and nonmedication treatments for reducing ADHD symptoms. The results of their statistical analysis of existing research data, shown in Table 11–1, indicate weak effect sizes for most nonpharmacological treatments. It is important to keep in mind, however, that these results are based on group data and that for any particular individual, any given treatment may be significantly more or less effective, for any number of reasons, than is indicated in data based on studies of groups.

It should be noted, however, that although meta-analyses for behavioral interventions did not show significant improvement on core ADHD treatment when raters were blind to who was taking the treatment, another meta-analysis demonstrated that behavioral interventions can have positive effects on a range of other outcomes when used with parents to improve parenting style (Daley et al. 2014).

Additional Supports

For students who have significant difficulty in a particular subject area(s) and need more remedial tutoring than their school can provide, many have found the Khan Academy (www.khanacademy.org/) to be a valuable resource. This site provides a wide range of concise presentations on countless topics for students from elementary school through college. It is free and is available 24/7.

Some parents arrange private tutoring for their son or daughter. Often school administrators or other parents can recommend a local tutor

TABLE 11–1. Magnitude of treatment effects for attention-deficit/hyperactivity disorder (ADHD) medications and nonmedication treatments for reducing ADHD symptoms

Treatment interventions	<i>d</i>
Stimulant medication	0.9
Nonstimulant medication	0.7
Restricted elimination diets	0.5
Artificial food color exclusions	0.4
Neurofeedback	0.3
Computer cognitive training	0.175
Behavioral parent training	0.025

Note. Results are reported using Cohen’s *d*, a statistical measure that yields decimal fractions to show how much effect a treatment has in comparison to another treatment or to a nontreatment. A *d* of 0.2 is considered small, and 0.5 is considered medium. A *d* of 0.8 indicates a large, significant difference.
Source. Data from Faraone and Antshel 2014.

or a moonlighting teacher who is skilled in a specific subject area where help is needed. Many schools also have peer tutoring available during the school day.

Two other programs offer valuable resources for parents of children with ADHD. Understood (www.understood.org/en) is a noncommercial online resource that offers a wide range of articles and videos online to help parents get free, up-to-date, unbiased information to help them in their efforts to understand and provide resources for their children from preschool through college who are struggling with attention and/or learning problems.

Another useful resource is the Parent to Parent Program of CHADD (www.chadd.org/Training-Events/Parent-to-Parent-Program.aspx), which offers structured multisession, 14-hour educational experiences taught by experienced parents of children with ADHD for parents seeking help in understanding and dealing with the problems of their children with ADHD and help in advocating for their children. Sessions are offered in face-to-face, webinar, and on-demand formats, each for a fee.

Summary

Medications alone are not usually adequate for effective treatment of ADHD. In this chapter, a wide variety of nonmedication interventions for ADHD that are often helpful for patients with ADHD and their families are described. The most important aspect of treatment is for the clinician to provide accurate, science-based information about the nature of ADHD, how it may change across the life cycle, and how it can most effectively be treated. Questions frequently asked by parents concerned about their child with ADHD are presented with suggestions for appropriate guidance to be adapted and offered by the clinician.

When the patient is a student in elementary or high school, it may be necessary and helpful for the diagnostic process for the clinician to collaborate not only with the patient and family but also with the school staff to establish ongoing communication and arrange possible interventions or accommodations to be provided by the school. Practical information and suggestions about such arrangements are offered in this chapter along with information about other useful resources. Information about resources and supports for college and postgraduate students is also included.

The chapter also furnishes suggestions about the possible usefulness of supportive psychotherapy, cognitive-behavioral therapy, couple therapy, and coaching for ADHD. The chapter concludes with research-based information evaluating various alternative treatments.



Treatment Adaptations for ADHD With Various Complications

IN EARLIER CHAPTERS, I HAVE DESCRIBED THE many differences among persons with attention-deficit/hyperactivity disorder (ADHD) (Chapter 3), how and why other disorders often co-occur with ADHD (Chapter 7), and practical aspects of treatments for ADHD (Chapters 10 and 11). In this chapter, I describe how treatments can and should be adapted for individuals whose ADHD is complicated by one or more additional problems, such as anxiety, depression, learning disabilities, or addictions. This chapter is not just about situations where the patient is diagnosed with an additional disorder. It also recognizes that sometimes such additional problems need to be addressed in treatment, even if the patient's symptoms may not fully meet all the diagnostic criteria for the co-occurring disorder. Clinicians do not treat disorders; they treat individual patients, many of whom are likely to have complications that need to be taken into account in order to adequately improve the impairments related to ADHD and their patients' overall quality of life.

Effective treatment of the patient with ADHD needs to take into consideration not only the identified symptoms but also other learning,

psychiatric, and medical difficulties that the patient may experience. In considering such additional difficulties, it is important for the clinician to take note of various types of impairment that may be present but that do not necessarily meet all of the official diagnostic criteria for an additional disorder. If a person tends to be chronically quite anxious or frequently discouraged and sad, those problems may have considerable negative impact on how that person functions and how he or she responds to ADHD treatment, even if the full criteria for a diagnosis of anxiety disorder or depression are not met.

In this chapter, I also provide brief descriptions of how treatment for ADHD may be modified to address related problems of particular adult or child patients. More detailed information about dealing with these overlapping disorders is provided elsewhere (Brown 2009).

ADHD With Anxiety

For persons with ADHD who also have significant problems with anxiety, a treating clinician needs to determine with the patient what is currently causing the most difficulty in daily life: Are the anxiety symptoms or the ADHD impairments making the most trouble for the patient at the present time? Which of these difficulties should be addressed first? Some ongoing conversation between patient and clinician, in exploratory psychotherapy or in cognitive-behavioral interventions, may be needed before the possibility of medication treatments can be adequately considered. In other instances, when the person has incapacitating worries or acute panic attacks or severe difficulties in falling asleep or in awakening related to his or her anxiety, starting medication treatment with an antianxiety medication such as a benzodiazepine or a selective serotonin reuptake inhibitor (SSRI) may be important to stabilize the patient so that the ADHD symptoms can be dealt with more adequately.

In some patients with ADHD, the chronic anxiety is due not so much to exceptionally strong mechanisms of their brain for generating anxiety but to their excessively weak executive function abilities to modulate emotion. The executive function ability to modulate anxiety is that capacity to say to oneself, “Yes, this looks like it could be scary or embarrassing or painful right now, but it may not be *that* big a deal! Calm down and look at the larger picture; it’s possible that this may not turn out to be as big a problem as I was imagining.” The capacity to modulate anxiety this way is an example of what is sometimes spoken of as “top-down” control of emotion—use of higher cognitive functions to respond to “bottom-up” emotional responses that come with too much attention fo-

cused on fear and worst-case possibilities “from the gut” without adequate awareness of the fuller context and of the ways the situation could be addressed.

At present, ADHD medications are not approved for use in alleviating excessively intense emotion, but a significant number of patients report that their ADHD medication helps them to remain more calm and to be less easily agitated or upset by experiences or thoughts that made them quite anxious before they were taking the ADHD medication. In strengthening patients’ other executive functions, the ADHD medication may also be strengthening their ability to modulate their anxiety or other emotions that prior to medication use were excessively intense or persistent.

In past years, and sometimes even today, clinicians were oftentimes reluctant to prescribe ADHD stimulant medications for patients with serious anxiety because they feared that stimulants would increase these patients’ anxiety. A recent meta-analysis of stimulant medication treatment in children with ADHD has challenged the assumption that stimulants are likely to cause or exacerbate anxiety.

After analyzing 23 studies involving almost 3,000 children with ADHD, Coughlin et al. (2015) found that treatment with stimulant medications for ADHD significantly reduced the risk of anxiety when compared with placebo treatment. These data led Coughlin et al. to recognize that some children do experience anxiety when treated with stimulants, but significantly more children with ADHD experience a reduction of anxiety with stimulant treatment. These findings have not yet been replicated in adult samples, but clinical experience suggests that patterns are similar in adult patients with ADHD.

If a patient is reporting seriously disabling anxiety problems, such as acute panic attacks with persistent worry about having another panic attack, or if the anxiety is seriously and frequently disrupting the patient’s eating or sleeping to the point where the patient is not able to function adequately during the day, primary consideration should be given to reducing the acute anxiety before any medication for ADHD is started. A trial of low dosing of a benzodiazepine may be needed to facilitate sleep or to provide immediate support for an imminent threat of a panic attack. Meanwhile, the patient is likely to benefit from some cognitive-behavioral therapy and/or psychotherapy targeted toward reducing the acute anxiety problems. An SSRI may also be started to reduce the patient’s baseline anxiety level.

However, if a patient is diagnosed with ADHD and reports chronic anxiety that is not acutely disabling, it may be preferable to discuss with the patient the possibility of starting an ADHD medication first and sta-

bilizing the dose to see if that medication can be tolerated and can be titrated to a dose that will significantly improve the ADHD symptoms while perhaps also helping to reduce the chronic anxiety by improving top-down executive control. Usually, a longer-acting stimulant medication is less likely to exacerbate anxiety than immediate-release formulations. If the patient is willing to do this and the ADHD medication regimen is adequately stabilized and if there is still persisting difficulty with anxiety symptoms, the possibility of adding an SSRI to provide further reduction of anxiety symptoms can be considered.

If a patient with ADHD has considerable difficulty with anxiety in addition to ADHD impairments, he or she may already be taking medications for anxiety that were prescribed prior to his or her seeking evaluation for ADHD. In that case, it is usually wise to consult with the clinician who prescribed the antianxiety medication to seek agreement to have the patient continue with the present antianxiety regimen when beginning a trial of medication for ADHD. Stopping the antianxiety medication and then immediately starting an ADHD medication would make it very difficult to tell whether emerging problems are due to stopping the one medication or starting the other.

In any case, the clinician should advise the patient that some people find ADHD medication makes them a bit more anxious for a time but the majority of patients find that ADHD medication does not cause increased anxiety and that it may actually help to reduce anxiety. The patient should be encouraged to contact the clinician before their next scheduled visit if there are any significant difficulties or questions.

Medication follow-up with a patient experiencing anxiety should include careful attention to any adverse effects and to the time and circumstances of their occurrence so that the clinician can help the patient sort out whether the adverse effects experienced result from the medication or from the patient's anticipation and expectation of such difficulties. If any adverse effects seem due to the medication, consideration should be given to the possibility of reducing the dose versus remaining at the starting dose for a bit longer to see if the patient's body becomes better able to tolerate the medication.

Many patients struggling with anxiety and ADHD also benefit from cognitive-behavioral treatments. Ramsay (2010) and Ramsay and Rostain (2015a, 2015b) have described how cognitive-behavioral techniques can be helpfully adapted to adults with ADHD and various complications. Szigethy et al. (2012) provide strategies for cognitive-behavioral treatment of children and adolescents, whereas Alfano and Beidel (2011) have compiled guidance for treatment of social anxiety in children and adolescents and young adults in a variety of situations. Al-

though not specifically focused on patients with ADHD, both of these books provide cognitive-behavioral treatment strategies that can be adapted for children and adolescents with ADHD and other disorders.

ADHD With Depression

If a patient presents with acute symptoms of major depression such as significant suicidal ideation, suicidal gestures, or suicidal intent, priority must be given to treating the acute depression. Likewise, if there are vegetative signs such as severe chronic difficulty falling asleep, persistently recurrent intermittent awakening, early morning awakening without ability to return to sleep, or severe anorexia with significant weight loss, the depression should be given treatment priority. Any such constellation of symptoms requires immediate measures to provide support and to attend to concerns regarding patient safety. Usually, such symptoms require immediate initiation of an antidepressant medication with therapeutic exploration of precipitating factors, evaluation of family or other social support, and possibly a brief hospitalization. Only after such acute symptoms are adequately stabilized is it sensible to initiate treatment targeting ADHD impairments. Yet this is not to say that the ADHD impairments present should be ignored; addressing these may eventually help to support the patient's recovery.

However, if a patient with ADHD has complaints of nonacute symptoms of major depressive disorder or persistent depressive disorder (dysthymia), the clinician may want to consider beginning treatment with a stimulant medication to see if that might help to alleviate some of the depressive symptoms. Sometimes depressive symptoms in persons with ADHD are reactive to their continuing frustration and demoralization resulting from their untreated or inadequately treated impairments related to ADHD.

If there is not significant improvement in that patient's depressive symptoms once the dosage of stimulant medication has been adequately titrated and stabilized, an SSRI or other antidepressant medication might be added to target the depressive symptoms more directly. This sequence of stimulant treatment first provides the patient with a trial of a medication that might have some immediate beneficial effects; this can be important to the patient, who otherwise may be waiting 4–6 weeks before any antidepressant medication is likely to become effective. Throughout the early weeks of treatment, psychotherapeutic sessions can provide an important resource for stabilization as well as an opportunity to gain a more adequate understanding of the respective contributions of the ADHD and the depressive symptoms to the patient's impairments and misery.

ADHD With Learning Problems in Reading, Math, and/or Written Expression

As discussed in Chapter 7 (“How and Why Other Disorders Often Co-occur With ADHD”), there are significant overlaps between ADHD and learning disorders, but also significant differences. If a patient is referred with complaints of difficulties with reading, math, or written expression, it is advisable to investigate possible ADHD-related impairments in areas such as the ability to sustain attention, to shift focus, to complete academic tasks in a reasonable time, and to utilize working memory, as well as specific impairments in academic skills. Likewise, if a patient presents with concerns about ADHD, it is important to get a good history of his or her functioning in school, including asking about notable difficulties with reading, math, and/or writing at various points in the patient’s schooling.

Sometimes it is clear that the primary problem is with ADHD-related impairments and that academic skills are not and never have been a problem. Yet for many persons with ADHD who are struggling in school, there is also an underlying problem with reading, math, and/or writing that needs to be assessed as well. If the patient reports such skills difficulties, it may be useful to supplement the usual ADHD assessment with a psychoeducational evaluation that includes a normed IQ test such as one of the following:

- Wechsler Intelligence Scale for Children (5th Edition [WISC-V], for children ages 6–16 years) (Wechsler 2014)
- Wechsler Adult Intelligence Scale (4th Edition [WAIS-IV], for teens or adults age 16 and older) (Wechsler 2008)
- Woodcock-Johnson IV Tests of Cognitive Abilities (WJIV; for ages 2–90 years) (Woodcock-Johnson 2016a)

In addition to such a measure of cognitive abilities, the psychoeducational evaluation should also include an individually administered academic achievement test such as one of the following:

- Wechsler Individual Achievement Test (3rd Edition [WIAT-III], for ages 4–50 years) (Wechsler 2009)
- Woodcock-Johnson IV Tests of Achievement (WJIV, for ages 2–90 years) (Woodcock-Johnson 2016b)

Such tests, usually administered, scored, and interpreted by a school psychologist or a clinical psychologist, provide standardized measures

of ability and academic achievement scored for age and grade-level comparisons. Score reports provide comparisons between ability and achievement for the variety of specific abilities tested. In combination with school achievement data, they are usually sufficient to identify students who suffer from specific learning disorders.

For students with ADHD, with or without a specific learning disorder, index scores on the Wechsler IQ tests typically, though not always, show relative strengths in verbal comprehension and/or perceptual reasoning, with relative weaknesses in working memory and/or processing speed (Brown et al. 2009, 2011a; Kennedy et al. 2016). For students who also have a specific learning disorder, achievement scores in the impaired skills will usually, though not always, be 1.5 or more standard deviations below scores on the relevant ability measures.

However, such discrepancies alone may not be sufficient for diagnosis of a learning disorder in some settings. Some school systems do not use the IQ-achievement discrepancy model for identifying students with learning disabilities; instead they utilize a response-to-instruction model that is more directly tied to the curriculum utilized in the school. The response-to-instruction approach remains somewhat controversial (Reynolds and Shaywitz 2009).

Two additional measures may be helpful in some cases. For identifying students in high school or beyond who need extended time for taking standardized tests, the Nelson-Denny Reading Test (Brown et al. 1993) allows comparison of how the student performs on reading tasks with standard time versus extended time. In conjunction with ability and achievement testing, this measure may be helpful in arranging for the student to receive extended time for standardized testing.

For students who have extraordinary difficulty in learning a foreign language, the Modern Language Aptitude Test (Carroll and Sapon 2002) allows comparison with norms for high school and college students; this measure can be helpful to school or standardized testing authorities for assessing whether the student's impairments in learning a foreign language warrant a waiver from school requirements for taking courses in foreign language.

Assessment for a specific learning disorder does not usually require the patient's undergoing a full neuropsychological evaluation, which involves many more tests and much higher costs. If a patient is identified as having a specific learning disorder in reading, math, and/or written expression, it is quite likely that there will also be evidence of ADHD-related impairments that should be treated. In Chapter 7, I describe the multiple facets of ADHD that overlap with learning disorders. Even if the student with learning problems does not manifest

severe ADHD-related impairments, there is a good reason to try ADHD medications in order to optimize the student's ability to participate and utilize remedial tutoring for his or her specific learning impairments. It should be noted that ADHD medication alone is unlikely to be sufficient for remediation of a specific learning disorder. Usually, remedial instruction in the specific areas of weakness is needed in addition to medication.

The other domain of intervention for students with significant learning problems is accommodations. Information about the types of accommodations that may be provided and procedures for arranging them is provided in Chapter 11 ("Practical Aspects of Nonmedication Interventions for ADHD").

ADHD With Emotional Regulation and Mood Problems

Problems with managing emotions are not uncommon in persons with ADHD, but they are not characteristic of all who have been diagnosed with ADHD. An overview of relevant research studies found that 25%–45% of children with ADHD and 30%–70% of adults with ADHD tend to have chronic problems with dysregulation of their emotions (Vidal-Ribas et al. 2016). Shaw et al. (2014) describe "emotional dysregulation" as a pattern of emotional expressions that are excessive in regard to social norms and inappropriate to context; involve rapid, poorly controlled shifts in emotions (lability); and/or involve unusual and excessive focus of attention on emotional stimuli. They suggest that this is in contrast to adaptive "emotional regulation," the ability of an individual to deal flexibly and adaptively with emotionally arousing stimuli in ways that do not defeat his or her own interests. Obviously, expectations for self-regulation of emotions vary according to the person's age and developmental level.

Most research in this area thus far has focused on emotional dysregulation manifest in irritability or aggressive behavior. These two forms of emotional dysregulation are, in many cases, significant aspects of a variety of different diagnoses, such as oppositional defiant disorder, bipolar disorder, major depressive disorder (especially in children or adolescents), generalized anxiety disorder, disruptive mood dysregulation disorder, conduct disorder (CD), and intermittent explosive disorder.

If a patient with ADHD presents with significant problems of chronic irritability or excessively aggressive behavior, it is important for the clinician to gather information about the history and circumstances of those behaviors. If the patient is already taking medication for ADHD

and these mood problems seemed to have their initial onset with the use of that medication, it may be that the ADHD medication itself is contributing to or precipitating the mood problems. In inquiring about this possibility, it is important to query about the time of day and the situations in which the mood problems are emerging. If the problems occur shortly after the ADHD medication is ingested and then improve when the medication is expected to be wearing off, it may be that the dose of the ADHD medication is too high for that patient or that the patient is simply not able to tolerate that drug.

However, if the patient is not reporting mood problems throughout the time the medication is active and does experience excessive moodiness around the time the medication is wearing off, that may be a sign of rebound, in which the moodiness is a reaction to an excessively rapid downward trajectory of the medication's effects such that the person is "crashing." In that case, the mood problem may be resolved by adding a small booster dose to slow down the excessively rapid declining trajectory of the medication's effects. Sometimes rebound moodiness is characterized by heightened irritability, sometimes by anxious restlessness, and sometimes by depressive mood symptoms.

If the patient is presenting with a history of mood problems that did not start in response to ADHD medication, then diagnostic inquiry should focus on what kind of mood problems occur, how often and for how long these mood problems have been occurring, and what circumstances make them better or worse. It may also be helpful to inquire as to whether any blood-related relatives have shown a similar pattern of mood problems so that both genetic and environmental etiological factors can be taken into account.

If the patient with ADHD has a long history of excessive irritability, low frustration tolerance, frequent or protracted temper outbursts over relatively trivial matters, or excessively aggressive verbal or physical actions that are apparently not due to excessive drinking of alcohol, other drug use, or environmental provocations (e.g., household members or others deliberately provoking), a trial of stimulant medication may be a reasonable first step. Both stimulant medication and atomoxetine have been shown to be effective in alleviating core symptoms of ADHD but also often have beneficial effects on emotional dysregulation. Shaw et al. (2014) have reviewed the evidence and recommend these ADHD medications as first-line treatment for emotional dysregulation, possibly with accompanying behavioral treatments. Another option with some empirical support is guanfacine in combination with a stimulant. This combination has been approved by the U.S. Food and Drug Administration (FDA) for such difficulties.

For patients with ADHD and depression who have prominent emotional dysregulation, Shaw et al. (2014) suggest that stimulant medication combined with an SSRI may be a reasonable choice. However, there is reason to be cautious in use of antidepressant medications with child, adolescent, or young adult patients who manifest more severe mood symptoms, such as signs of major depression and anxiety, and episodic manic symptoms, such as sleep disturbances, anger or irritability, increased energy, or rapid mood fluctuations. Rios et al. (2015), in their study of early stages of bipolar disorder, noted an emerging body of evidence that treatment with antidepressants, tricyclic antidepressants or SSRIs, may precipitate or exacerbate suicidality and manic symptoms, possibly reducing age at onset of mania. This risk warrants careful monitoring of patient response when an antidepressant is being started, especially in the early weeks.

Rios et al. (2015) also noted that acute treatment with stimulants may stimulate mania in persons in the prodromal stage of bipolar disorder. However, Carlson and Meyer (2009) emphasized the importance of treating ADHD impairments in patients with significant mood problems. They suggested that if a patient clearly seems to have mania or a bipolar disorder, treatment should begin with a mood stabilizer and/or an atypical antipsychotic medication, with medication treatment for ADHD added after the mood problems are stabilized if the patient remains impaired by ADHD symptoms. In situations where a mood disorder diagnosis is less clear-cut, Carlson and Meyer described beginning with ADHD medication treatment as acceptable so long as the clinician is alert to possible disinhibition resulting from stimulant medication. Joshi and Wozniak (2015) emphasize that medication treatment of ADHD should not be addressed in cases of bipolar disorder until after the bipolar symptoms have been stabilized. However, they also recognize that in a mood-stabilized youth with bipolar disorder, ADHD symptoms with their impact on social, academic, and emotional functioning often become the next most severe complaint presented by the patient.

ADHD With Sleep and Arousal Problems

Many children, adolescents, and adults with ADHD report chronic difficulties with sleep and arousal, often from early childhood. There are three types of difficulties with sleep and arousal that are commonly reported by persons with ADHD and their family members:

- Difficulty falling asleep and sustaining sleep
- Difficulty awakening
- Difficulty maintaining adequate alertness for activities during the day

For many children and some adults, it is often difficult to stop activities of the day at a reasonable time. Some children with ADHD are chronically oppositional and tend to resist directions to prepare for bed much as they resist many other directions from their parents. Many children and adults with ADHD find it very difficult to stop their evening activities and get settled into bed at a reasonable time even when they recognize the need to do so. Sometimes the problem with older children, adolescents, and adults is staying up late to finish homework or reports they are expected to hand in the next morning at school or work. More often, delays in getting into bed are due to their reluctance to stop engaging in favored activities such as watching television, playing video games, texting or interacting on social media with friends, surfing the Internet, or pleasure reading.

In many instances, the individual may get into bed but continue to engage in these activities that interest him or her. Sometimes adolescents or young adults will get into bed, fall asleep, and then be awakened by friends who text them at late hours and whom they want to talk with or feel obliged to interact with until very late. Many of those who are chronically delayed in getting to sleep report, "I really want to get to sleep earlier, but most nights I just can't shut my head off, so I have to busy myself with something else until I'm exhausted. I can fall asleep easily at that point, but often that doesn't leave me many hours to sleep."

Some individuals with ADHD report that they struggle on many nights with getting to sleep because of thinking about things that sadden or worry them; they are unable to dismiss those disturbing thoughts and associated feelings when trying to get to sleep. At such times, they may be flooded by sadness, worry, or guilt about something that has recently happened or something they expect to happen soon.

When onset of sleep has been delayed, regardless of the reason, total sleep time is reduced. For those who are required to get up so they can be on time for school or work, this can create significant problems, especially if sleep delays tend to be long and chronic.

A common result of chronic difficulty in getting to sleep is chronic difficulty in awakening on schedule. Some persons with ADHD report chronic difficulty in awakening even when they have had an ample quantity of decent sleep. Many with ADHD report that every day be-

gins with a protracted, very frustrating struggle between themselves and a family member who tries to awaken them or between themselves and their alarm clock, which they repeatedly reset for snooze until they realize that they are late or are going to be late getting to wherever they need to be. Chronic lateness to work or school is a common problem among individuals with ADHD.

Yet persons with ADHD who are often late to school or work, and even those with ADHD who are rarely late, often report chronic problems with excessive daytime sleepiness. Typically, their struggle with staying alert does not cause difficulties while they are physically active, talking a lot, or engaged in activities in which they have strong interest. More commonly, they report feeling drowsy, often barely able to keep their eyes open, when they have to sit still to listen to classroom instruction or to do required reading. Some report that often they actually fall asleep in such situations, even though they may be fully alert moments later when they can get up to become more active.

Baird et al. (2012), Brown and McMullen (2001), Owens et al. (2009, 2013), Cortese et al. (2013a), and Philipsen et al. (2006) have reviewed details about research on these issues with sleep in individuals with ADHD. They have also described physiological mechanisms likely to underlie these sleep difficulties and make them more common in children and adults with ADHD. Here I will simply mention a few additional physiological factors that may contribute to sleep problems in persons with ADHD. Some children with ADHD have chronic problems with sleep-disordered breathing, sometimes due to enlarged tonsils and/or adenoids. Some children and adults have restless legs syndrome, and some adolescents and adults experience chronic fatigue as a result of undiagnosed obstructive sleep apnea. Each of these three problems is usually diagnosed with polysomnography after a clinical interview.

Interventions for patients whose ADHD is accompanied by sleep problems usually begin with the clinician taking a careful history of the nature and pattern of the sleep problems, being careful to inquire and note specifically what time the person usually gets into bed with intent to sleep, how long it usually takes to get to sleep, whether the person experiences intermittent awakenings, how difficult it usually is for him or her to wake up and get started with the morning routine, and whether the person or his or her family notices any problems with excessive daytime sleepiness. For children, inquiry should also be made about problems with bad dreams or enuresis.

Once an adequate history has been obtained, and the clinician has ruled out the possibility that some of the reported insomnia may be due

to stimulant medication administered too late in the day, some discussion of sleep hygiene is usually appropriate. This involves talking with the patient—and, for children, with the parents—about the importance of trying to maintain a stable, reasonable bedtime, a calming tapering down of activities before bedtime, avoidance of television and other electronics for at least an hour before bedtime, and consistency in getting out of bed at the same time each morning.

While working to address sleep problems, the patient or parents should be encouraged to maintain a sleep diary in which they note time of getting to bed, time of getting to sleep, number of awakenings, difficulties in awakening, episodes of excessive daytime sleepiness, and so forth. It can be helpful for the clinician to look at and discuss efforts of the patient or parents to improve the quality of sleep hygiene.

Another behavioral strategy is teaching progressive muscle relaxation, in which the patient is taught to maintain yoga-style deep breathing while doing a series of bilateral isometric contractions of selected muscle groups, followed immediately with maximal relaxation of that muscle group. Gradually, the patient shifts from one specific muscle group to another, starting with the feet, then moving to repeat the sequence of several maximal isometric contractions, each followed by maximal relaxation of those same muscles. After a few repetitions of one group, the isometric contractions and relaxation progress to calves, thighs, abdominals, shoulders and arms, neck, and face. If necessary, this whole sequence may be repeated several times. It can also be accompanied by development of relaxing visual imagery.

If these behavioral strategies are not adequate, the clinician may want to consider use of medications. Prince and Wilens (2009) have suggested that melatonin (1–3 mg for children; 5–10 mg for adults) taken about an hour before bedtime may be helpful. If that is not successful, they suggest clonidine (0.1–0.3 mg), diphenhydramine (25–50 mg), trazodone (25–50 mg), or mirtazapine (3.75–15 mg).

ADHD With Oppositionality and Aggression

About 10%–12% of the general population of children in the United States are found to have *oppositional defiant disorder* (ODD), a pattern of behavior characterized not only by angry, irritable mood but also by argumentative/defiant and/or vindictive behavior (Merikangas et al. 2010; Nock et al. 2007). Among children with ADHD, especially those with combined-type ADHD, the estimated prevalence of ODD is much

higher, ranging from 35% to 50%. A study of ODD in adults yielded an estimated prevalence of about 12% (Harpold et al. 2007).

ODD usually onsets at about 12 years, but this pattern of severe, chronic oppositionality and irritability sometimes appears in preschoolers who greatly exceed the oppositional and defiant behavior typical of most of their peers (Burke et al. 2010). For most of those affected, ODD symptoms usually taper down as they move through adolescence. More than 70% of those diagnosed with ODD no longer have behaviors and symptoms that meet diagnostic criteria by the time they are 18 years old, and most never qualify for diagnosis of CD.

Conduct disorder is a pattern of seriously delinquent behavior that involves aggression to people or animals, destruction of property, deceitfulness or theft, and other serious rule violations. Prevalence of CD is estimated at about 6% in the general population of adolescents.

Among that smaller number of children who qualify for a CD diagnosis, three characteristics are often found: deficient empathy, heightened threat sensitivity, and deficient decision making (Blair et al. 2014). Although many individuals with CD demonstrate deficient empathy from an early age with little indication of ability to recognize distress in peers and little remorse for hurting others, there is a subgroup of those with CD who do demonstrate empathy and whose functioning tends to be characterized by increased anxiety and hypersensitivity to threat; they often expect aggression from others to be directed at them (Blair et al. 2014).

Treatment of CD with cognitive-behavioral therapy may be helpful for addressing underlying anxiety. Encouraging parents to reduce stress at home, to use supportive rather than harsh limit setting, to monitor the child's activities, and to utilize other needed supportive services may also be helpful.

Stimulant medications are often helpful in alleviating excessive impulsivity and aggression. Usually, longer-acting formulations of methylphenidate or amphetamine are preferable to minimize need for administration of multiple doses each day and to reduce the likelihood of inappropriate use or diversion. Newcorn et al. (2009) and Wilens et al. (2015) have reported that guanfacine, a longer-acting, less sedating type of α_2 -adrenergic agent, is often effective in treating symptoms of hyperactivity, impulsivity, and aggression in those with ADHD. The FDA has approved use of guanfacine (1–4 mg) for monotherapy treatment of ADHD and in combination with stimulant medication. This combination may be particularly useful for treating patients with ADHD accompanied by ODD or CD symptoms. Newcorn et al. (2009) also noted that lithium, other mood stabilizers, and atypical antipsychotics have been

demonstrated to be helpful for chronic problems with aggression, although these medications require very careful considerations of risks and longer-term adverse effects.

ADHD With Obsessional and/or Compulsive Problems

Little research has been published regarding the incidence of obsessional or compulsive problems in persons with ADHD. Prevalence of obsessive-compulsive disorder (OCD) in the general population has been estimated at about 2.5% in adults and about 2%–4% in children. Sometimes OCD problems arise during childhood, with an average age at onset of about 10 years. For others, onset of OCD symptoms is usually not until the young adult years (onset at about 19 years on average), with symptoms having developed by at least age 25 years in 65% of those affected (Geller and Brown 2009).

For some individuals with OCD, the difficulties are with persistent obsessional thoughts that are disturbing. Individuals get stuck in repeatedly thinking about certain worries or disturbing images that they consider excessive or unreasonable, but they are often unable to clear such thoughts from their minds. An example would be recurrent worry that they might get bad grades in school, lose their job, or be abandoned by their parent or partner. Another example might be recurrent images of a loved one being fatally injured in a motor vehicle accident or of one's home being invaded by a robber.

Others are chronically caught up in feeling that they must perform certain actions, otherwise something very unpleasant will happen or they will simply not be able to relax and feel "just right." These compulsive behaviors might include checking multiple times to be sure they have locked a door or turned off a light or paid a particular bill. Some have no issues with checking, but they feel an almost irresistible urge to rearrange things to make them symmetrical or to walk into a room and then immediately walk out and then walk in again.

For many years, OCD was classified as an anxiety disorder because it was assumed that obsessional thoughts and compulsive behaviors were simply irrational actions to ward off or reduce anxiety. OCD was removed from the classification of anxiety disorders in DSM-5 (American Psychiatric Association 2013), and a new category was created, *obsessive-compulsive and related disorders*, which includes not only OCD but also disorders of hoarding, hair pulling, skin picking, and body image (i.e., persistent feelings that one has certain bodily features that are

defective, although they may not be noticeable to anyone else). Each of these disorders has its own distinctive characteristics, but all involve some aspects of struggling with perseverative thoughts or compulsive behaviors that are maladaptive, and all seem to involve somewhat related pathophysiology. Phillips and Stein (2015) have edited a book that provides careful descriptions of these related disorders as well as some guidance on effective treatment approaches for each.

Because many who suffer from OCD or related disorders feel ashamed of these difficulties, which they recognize as irrational, they may be hesitant to mention such problems to a clinician even while they may freely describe their ADHD, depression, or anxiety symptoms. In an initial evaluation, it may be helpful for the clinician to inquire about excessive worries and give some specific examples of the many varieties of obsessions and compulsions.

Three types of OCD-related problems that often are reported by patients with ADHD are hoarding of stuff, recurrent thoughts of failing at school or career, and excessive perfectionism in written expression. Hoarding may be an extension of the person's difficulty in organizing his or her stuff and prioritizing to determine which things are important to save and which should be discarded. Recurrent thoughts of oneself as destined to fail in school or career or relationships may be a consequence of repeated experiences of failure due to ADHD-related impairments of executive functions.

Excessive perfectionism in written expression is often manifest in a felt need to get the first sentence of any essay or report to sound "just right" before the second sentence can be written, and then to perfect that second sentence to sound just right before the third sentence can be started, and so on. This tedious approach to written expression may be an exaggerated compensation for fears of being seen as totally incompetent by potential readers.

For some patients with ADHD, taking stimulant medications may intensify their OCD tendencies, making them much more perfectionistic or more fearful of being exposed as incompetent than they would be without such medication. If this occurs, the clinician should assess the situation and reduce the dose or change the medication.

If such OCD tendencies were present prior to the patient taking stimulant medication or if the ADHD medication is not effective when the dose is reduced or an alternative medication is tried, it may be advisable to consider a trial of an SSRI or clomipramine. While those medications are not effective with all patients who struggle with OCD-related disorders, they may be quite helpful with some such difficulties. The Phillips and Stein (2015) book provides useful guidance on the variety of

cognitive-behavioral and/or medication treatments that have been demonstrated to be helpful for the various disorders in this category. Although not explicitly addressing ADHD, Egan et al. (2014) have published descriptions of cognitive-behavioral treatments that may be helpful with certain types of excessive perfectionism that may be seen with ADHD.

ADHD With Substance Use Problems

In Chapter 7, there is a description of how and why substance use disorders frequently occur in individuals with ADHD. In this section of this chapter, the focus is on how treatment should be adapted to provide adequate care for patients who are experiencing ADHD and varying degrees of “troublesome use” of substances like alcohol, marijuana, prescription drugs, cocaine, or heroin. This section also includes some suggestions on how to reduce misuse and diversion of medications used to treat ADHD.

Harstad and Levy (2014) noted that misuse and diversion of stimulant medications are more widespread than problems with abuse or addiction. *Misuse* refers to using medications not prescribed for the individual or using medications in larger or more frequent doses than prescribed. *Diversion* refers to transfer of a medication to someone other than the person for whom it was prescribed. The most common reasons reported for misuse of stimulant medications are for do intensive last-minute studying before an exam, to improve recall while taking an exam, to pull “all-nighters” to complete assignments, to experiment, to intensify excitement for partying, or to minimize drowsiness from heavy drinking (a practice that can lead to dangerously excessive intake).

Wilens et al. (2008) reviewed 21 studies and found that rates of non-prescribed stimulant use ranged from 5% to 9% among grade school and high school students and from 5% to 35% in college-age individuals. These percentages are estimates of how many students engaged in misuse of stimulants during the preceding year; they do not differentiate between those who misused once and those who misused repeatedly.

Clinicians who prescribe stimulant medications should educate patients and parents about the importance of keeping these medications secure, not having anyone carrying pills around in a backpack, and not leaving them in locations such as a bathroom medicine cabinet or on the kitchen counter where visitors can easily steal them. College students, especially those living in a dormitory, should be cautioned not only to keep their medication supply secure but also to consistently resist any

pleas from friends or acquaintances who want to buy or borrow some of their stimulant medication. They need to do this not only to protect themselves from running out of medication early but also to avoid violating federal laws that consider distribution of any Schedule II drug to someone else to be “dealing,” regardless of whether any money is involved or not.

Clinicians should also monitor carefully any patient who repeatedly requests a new prescription for the prescribed stimulant earlier than he or she should be running out of it. This may reflect a problem of carelessness in caring for the medication or deliberate misuse. Clinicians should also talk sensitively with patients who request an increase in their dose or in their frequency of dosing to determine whether such an increase is actually appropriate and needed to provide adequate coverage for this patient or is perhaps an early stage of excessive use that may become problematic and require further clinical exploration.

Incidence of substance use disorders in adults with ADHD is approximately three times the incidence of substance use disorders in the general population. Often substance use problems begin during early or middle adolescence and increase in severity during late adolescence, especially in adolescents with ADHD. Most often these substance use problems are not with stimulant medications; usually they are with nicotine, marijuana or hashish, and/or alcohol. Like others in the general population, some adolescents and adults with ADHD also struggle with unprescribed use of prescription drugs such as antianxiety medications like Xanax or Klonopin or opiate painkillers such as Percocet or OxyContin, or with cocaine or heroin.

When the clinician is evaluating adolescents or adults for ADHD, it is very important to inquire about the individual's past and current history of using cigarettes, alcohol, marijuana or hashish, prescription drugs, cocaine, ecstasy, MDMA (3,4-methylenedioxymethamphetamine), psychedelic drugs, and heroin. When the patient is an adolescent or young adult being seen with his or her parents, the parents should be asked about whether they believe that their son or daughter has had any problems with drug or alcohol use. If they indicate yes, the clinician should elicit a description. However, adolescents and young adults should not be asked about alcohol or drug use in the presence of their parents. That inquiry should be done privately in a nonjudgmental way with reassurance that the clinician will not disclose this information to the parents. It should include specific queries about what drugs, what quantities, and what sort of reactions the patient had to them. The clinician should also keep in mind that such reports from patients are usually underestimates. A useful resource for clinicians not familiar

with street terms for various drugs is *Buzzed: The Straight Facts About the Most Used and Abused Drugs From Alcohol to Ecstasy* (Kuhn et al. 2008).

If a patient diagnosed with ADHD is found to have a recent or current problem with alcohol or drug use, it is extremely important to take this into account in assessment and treatment planning. Persons with substance use problems are not all alike, and they do not all have the same needs for particular types of treatment. The so-called addictive personality is a myth. Individuals who become involved in substance use that reaches the level of a disorder vary considerably in their age, race, ethnic background, social class, and personality characteristics.

Maia Szalavitz (2016), who herself experienced and recovered from serious problems with drug addiction, has provided, in *Unbroken Brain: A Revolutionary New Way of Understanding Addiction*, an articulate description of the complex diversity among persons suffering from substance use disorders and their struggles in treatment and recovery:

Children who ultimately develop addictions tend to be outliers....[S]ome stand out because they are antisocial and callous...but others stand out because they are overly moralistic and sensitive. While those who are the most impulsive and eager to try new things are at highest risk, the odds of addiction are also elevated in those who are compulsive and fear novelty. It is extremes of personality and temperament—some of which are associated with talents, not deficits—that elevates risk. Giftedness and high IQ, for instance, are linked with higher rates of illegal drug use than having average intelligence. (p. 59)

Any efforts to provide help and support for persons with a substance use disorder should be guided by recognition that substance use disorders are not fundamentally fueled by a quest for pleasure but by desperate efforts to find relief from pain and stress that the individual has not been able to cope with adequately. This is important because it makes clear why curtailing a substance use disorder initially brings not just relief but also intensification of whatever emotional burdens that person has been trying to keep at bay by excessive use of the problematic substance. Initial pride and pleasure in stopping problematic use is often quickly challenged by fears of being overwhelmed by hidden vulnerabilities.

Many treatment programs for persons with substance use disorders are based on the assumption that persons with substance use disorders must “hit bottom” before they can recover—that they will be motivated to stop their addictive behavior only when they have suffered painful loss of virtually all that is valuable to them. This view often encourages parents and other family members to adhere to a “tough love” approach in deal-

ing with the addicted person. This model, often promulgated in 12-step programs such as Alcoholics Anonymous (AA) and Narcotics Anonymous, typically includes the notion that the goal of treatment must be achieving and sustaining total abstinence from the problematic substance. Another premise of such programs is that recovery can begin only when one admits to being totally powerless to overcome addiction and to needing to invoke the help of a higher power, which may be prayer and/or continuing attendance at AA or a similar support group. This approach has helped a very large number of people to find and sustain recovery from a substance use disorder, but there are also many for whom it does not work effectively and for whom it is a barrier to recovery.

An alternative approach to helping persons with a substance use disorder is *harm reduction*, as summarized in *Harm Reduction: Pragmatic Strategies for Managing High-Risk Behaviors*, edited by G. Alan Marlatt (1998). This approach acknowledges total abstinence as a worthy goal, but it accepts alternatives that reduce harm. It is a gradual “step-down” approach that encourages those engaged in high-risk behaviors to take it “one step at a time” to reduce the harmful consequences of their substance use.

Harm reduction approaches do not wait for an individual to “hit bottom”; they try to encourage individuals to reduce their problematic use to less destructive levels so they can protect whatever resources they have. Szalavitz (2016) emphasizes the potential benefit of this approach:

[P]eople are actually more likely to recover when they still have jobs, family, and greater ties to mainstream society, not less. Indeed, the more “social capital” someone has—friends, education, employment, job contacts and other knowledge that promotes links to the conventional world—the more likely recovery is. (p. 184)

Over the past 20 years, there have been many changes in scientific understanding of addiction and its treatment. Carroll and Rounsaville (2006) have described how and why inpatient treatment for substance use disorders is now much less frequently used. It has been replaced by outpatient and intensive day treatment approaches that seek to help patients to learn to cope with their addiction in the context of their own community. It is now known that brief behavioral therapies with a motivational approach are more effective for most individuals with substance use disorders. These approaches typically include

assessment and feedback on substance use and consequences; an empathic, nonjudgmental stance by the clinician that emphasizes individual choice and autonomy; acceptance of client ambivalence about his problem behavior; and emphasis on a range of client goals that may or may not include formal treatment or abstinence. (Carroll and Rounsaville 2006, p. 227)

If a clinician is evaluating a patient with ADHD and finds that the patient has a current substance use disorder that is significantly impairing functioning, the clinician needs to determine with the patient whether the substance use disorder is at a point where involvement in specialized treatment such as motivational behavioral therapy or intensive outpatient treatment may be needed. For more acute problems, detoxification or residential treatment may be needed. Medication treatment for ADHD is not likely to be effective in such circumstances and may, in fact, exacerbate the problem, although it may be quite helpful once the acute phase is resolved.

If a patient with significant impairment from ADHD has a pattern of occasional use of alcohol or marijuana that is not significantly disrupting his or her functioning, a cautious trial of medication treatment for ADHD may be quite appropriate. In such situations, longer-acting formulations of stimulants or nonstimulant medications for ADHD are less likely to be misused and more likely to be effective than are preparations with medium duration of action or immediate-release preparations (Wilens and Morrison 2015).

If a clinician agrees to undertake such a treatment plan, it is important to provide close monitoring of both medication use and the pattern of alcohol or marijuana use, including not only frequencies but also quantities. The clinician, in such situations, needs to avoid the role of “enforcer” for reducing alcohol or marijuana use. Techniques of motivational interviewing described by Miller and Rollnick (2013) can be helpful in respecting the patient’s ambivalence and autonomy.

With such support, many patients with ADHD are able to maintain a helpful regimen of medication treatment for their ADHD while holding their use of marijuana to low doses a couple of times a week and their consumption of alcohol to a reasonable level. However, for some patients, it is extremely difficult to avoid resuming excessive use, in which case the medication for ADHD is likely to become ineffective and they are likely to return to a situation where they have insufficient motivation to do tasks important for their success.

ADHD With Asperger Syndrome or Other Autism Spectrum Difficulties

As mentioned in Chapter 7, the current diagnostic manual, DSM-5, does not include the diagnosis of Asperger syndrome (AS); it incorporates this syndrome into the autism spectrum. However, that change remains controversial, and many clinicians feel that it is more useful to continue

to use the AS diagnosis while the matter is further researched. In this section, following some brief comments on adapting treatment of ADHD for individuals with other types of autism spectrum impairments, I focus primarily on how treatment for ADHD can be adapted for those whose ADHD is accompanied by the impairments of AS.

The impairments of children with classical autism spectrum disorder (ASD) are usually recognized by their parents within the first 2 years of life (Volkmar et al. 2008). Concerns about delays in speech and language development usually appear earliest, followed by concerns about delays in social responsiveness and communication, which are generally recognized as being noticeable sometime before the child's second birthday and may include diminished eye contact, limited interest in interacting with others, reduced smiling and looking at others, and preference for being alone.

Extensive research over the past 20 years emphasizes the importance of early diagnostic assessment (Bishop et al. 2008), early intensive naturalistic behavioral intervention for young children with ASD (Koegel et al. 2008), early family support (Bailey 2008), and appropriate special education to optimize critical developmental processes during preschool and beyond.

Generally, these interventions do not require medication treatments during the first few years. However, some children with ASD in preschool years or beyond demonstrate significant problems with inattention, hyperactivity, and impulsive behaviors that are characteristic of ADHD and that present safety risks or significantly impair their ability to participate adequately in intervention programs. There are no medications specifically targeted for ASD, but some of these children may benefit from a cautious trial of medication, although many have a very sensitive body chemistry and are likely to have more problems with side effects than most other children of similar age. An excellent guide for parents on the medical aspects of ASD and AS is Dr. Edward Aull's book *The Parent's Guide to the Medical World of Autism: A Physician Explains Diagnosis, Medications & Treatments* (Aull 2013).

Individuals with ADHD and AS, unlike most others on the autism spectrum, usually have language skills that are acquired on time and often developed precociously, although they may speak in a pedantic manner, and typically demonstrate some degree of interest in social interaction. Their social impairments usually do not become fully apparent until late preschool years, often becoming much more problematic during middle childhood and adolescence. They also tend to have at least average, and often above-average, IQ and narrow, factually oriented but circumscribed, areas of interest that tend to interfere with

their learning and with their being able to sustain reciprocal conversation (Volkmar et al. 2014).

Often persons whose ADHD is combined with AS are brought for treatment during elementary, middle, or high school because of inattention problems and/or problems with social interaction with peers; often the social problems include persistent difficulties with being bullied. For example, a 13-year-old boy was brought by his mother for evaluation:

Case Example: A 13-year-old without developed social skills

Fred was in eighth grade and was in special education classes; he had been diagnosed with ADHD in fourth grade. He had been prescribed two different ADHD medications but in each instance had to stop the medication because of adverse effects, primarily increased anxiety. At the time of initial evaluation, he was taking 50 mg of sertraline but had become increasingly resistant to doing schoolwork, often sitting in classes with his head on his desk, refusing to do classwork or homework, and missing many days of school with complaints such as stomachache and headache. At home, he spent most of his time in his room playing video games. When I asked him to describe himself, he said, "I hate school, and I have no real friends." His major complaint was that he hated being in special education classes: "The teachers keep telling me that I'm very smart, but they treat me like a fourth grader. I'm not going to do what they tell me until they start treating me a lot better."

In our psychotherapy sessions, Fred initially tried to press his argument that his teachers needed to change their behavior before he would change his. After a few sessions, he responded to my confronting him with how he would need to change his oppositional behavior at school before anyone would change anything else for him. I administered an IQ test, and Fred scored in the superior range. Seeing those results, he said, "OK, I know I'm smart, but I really am broken." We then began to talk about how he would soon be starting high school, where he could be placed in mainstream classes if he could show that he would do his job as a student for the remaining months of the school year. I also told him that if he wanted to improve his interactions with classmates, he would need to use his strong intellect to learn skills for dealing with adults and other kids, skills that most kids pick up intuitively. Low doses of stimulant medication were prescribed for Fred's ADHD, which he was able to tolerate as the dosage was very gradually increased. Over the final quarter of the semester, his behavior and work output at school improved markedly, and he was able to start ninth grade in mainstream classes. This combination of having his strong abilities confirmed while addressing his weaknesses in social skills, combined with gradual introduction of ADHD medication, helped to motivate Fred to make the necessary changes to achieve his goal.

Sometimes the difficulties of someone with ADHD and AS do not become apparent until the move away from home to college. This is il-

illustrated in the vignette about Alan in Chapter 9 (“Emotional Dynamics in Individuals, Couples, and Families Coping With ADHD”). Additional educational and social support interventions for individuals with autism as they approach adulthood are provided by Wehman et al. (2009).

These examples illustrate just a few of the many ways in which individuals whose ADHD is accompanied by AS need assistance. Many are able to become quite successful if they receive adequate help and support not only for their ADHD-related impairments but also for their impaired social skills and for their anxiety, which often involves social anxiety with chronic avoidance of situations they fear. Medication may play a helpful role in these difficulties, but it needs to be very cautiously utilized, starting with minimal dosing and slow increases in dosage, because of these individuals’ often very sensitive body chemistry.

Summary

For the many individuals whose ADHD is complicated by various other learning, psychiatric, or medical problems, it is very important for the clinician to adapt treatment plans for the specific needs of the patient. This is crucial not only for those who fully meet diagnostic criteria for another disorder but also for patients who are affected by additional symptoms, even if those symptoms do not fully meet official diagnostic criteria.

The discussions in this chapter provide some brief guidance for clinicians who are treating children or adults whose ADHD is complicated by additional difficulties. More detailed guidance for such complicated situations is included in *ADHD Comorbidities: Handbook for ADHD Complications in Children and Adults* (Brown 2009). That edited volume offers, for example, full chapters on ADHD with anxiety disorders, mood disorders, sleep disorders, substance use disorders, oppositional and aggressive disorders, and learning disorders in multiple age groups, each chapter written by experts who are specialists in that field.

This chapter moves beyond the information in Chapter 7 about various co-occurring disorders. It provides information about how ADHD assessment and treatment may need to be adapted for patients who also suffer from anxiety, depression, specific learning problems, emotional regulation and mood problems, sleep and arousal problems, oppositionality and/or aggression, obsessional and/or compulsive problems, substance use problems, Asperger’s syndrome and other autism spectrum difficulties, or any combination of these.

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Outside *the Box: Rethinking ADD/ADHD in Children and Adults—A Practical Guide* assails decades-old assumptions and presents an up-to-date, science-based understanding of this disorder that causes significant impairment and considerable suffering for 8%–10% of children and at least 5% of adults.

Designed for the layperson, as well as for clinicians, the book offers science-based answers—in plain, understandable language—to questions such as "Why are those with ADD/ADHD able to focus very well on a few tasks in which they have strong interest but are unable to focus adequately on many other tasks they recognize as important?" "How is ADHD like having 'erectile dysfunction' of the mind?" "Is medication treatment for ADHD more or less risky than its not being treated with medicine?"

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